

REPORT NUMBER 139

JANUARY 1964

CALCULATED WEIGHT, BALANCE and MOMENTS of INERTIA

AD 654041



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Report Number 139

CALCULATED WEIGHT, BALANCE AND
MOMENTS OF INERTIA

XV-5A LIFT FAN
FLIGHT RESEARCH AIRCRAFT PROGRAM

JANUARY 1964

Advanced Engine and Technology Department
General Electric Company
Cincinnati, Ohio 45215

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JUL 5 1967
B

MF
13 MAY 1968

RYAN

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1.0 INTRODUCTION

This is the calculated weights report for the U.S. Army XV-5A Lift Fan Flight Research Aircraft.

The XV-5A was designed to evaluate the flight characteristics of the lift fan propulsion system and to demonstrate capability of the system with a high sub-sonic . The aircraft has an aspect ratio 3.4 mid-wing and provides side-by-side seating for pilot and observer. The total propulsion system consists of the General Electric X353-5B propulsion unit made up of two J85-5 turbojet engines, two wing fans, and two exhaust gas flow diverter valves. The General Electric X376 pitch fan is installed at the nose of the aircraft. A general arrangement and three-view of the aircraft are shown in Figures 1 and 2.

The report contains weight and balance and aircraft moment of inertia data in summary and in detail. The summary data is given for several fuel, flight test instrumentation combinations considered compatible with the Flight Test Program. Performance requirements were written for endurance missions of 20 and 45 minutes and therefore weights data are given for the aircraft with fuel to perform these missions with flight test instrumentation included. The design gross weight of the aircraft is 9200 lbs., and therefore data is given for this weight.

Although this is designated as a calculated report, approximately 85 percent of the aircraft weight was obtained from measurement of component and sub-assembly weights. In addition, the aircraft itself was weighed and this actual weight has been used to derive various gross weight loading conditions.

The Weight Empty given herein includes only those items required by the Aircraft Specification. It does not, for instance, include the auxiliary fuel tank nor instrumentation or other temporary items installed for initial flight test purposes.

Horizontal distances used in this report are measured from fuselage station zero. Vertical distances are measured from a theoretical plane 100 inches below the fuselage horizontal reference plane.

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XV-5A GENERAL ARRANGEMENT

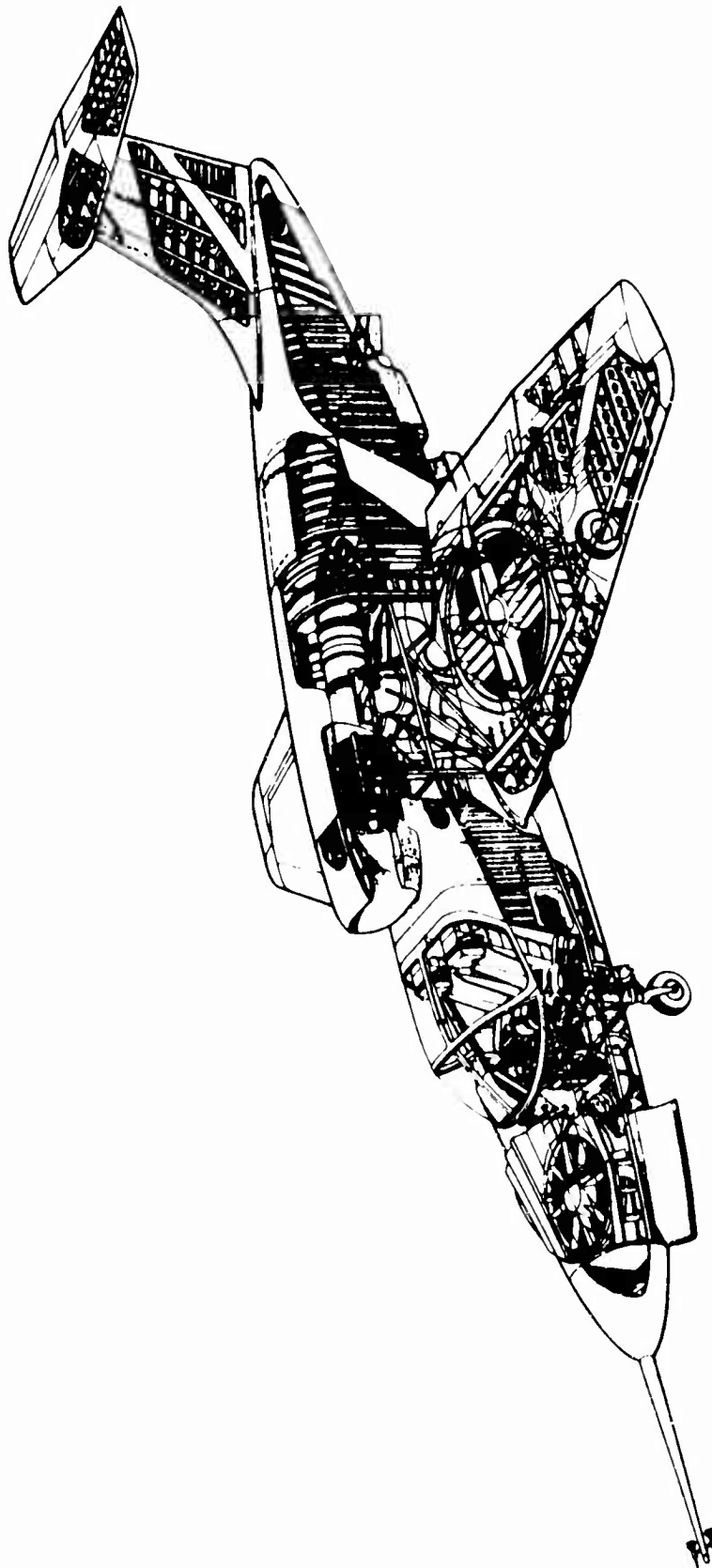


Figure 1

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2.0 WEIGHT AND BALANCE

2.1 Weight and Center of Gravity Summary

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XV-5A THREE VIEW

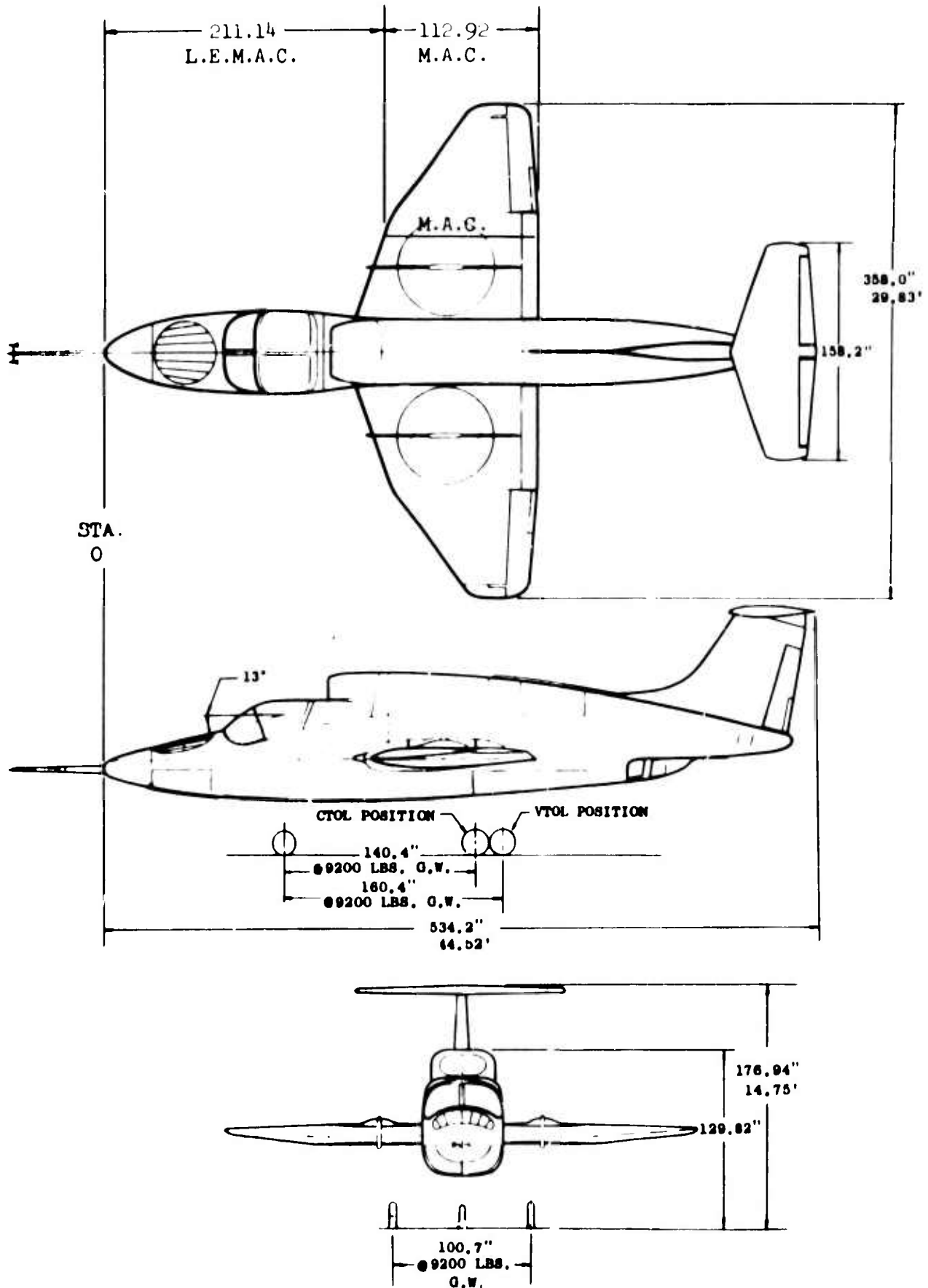


Figure 2

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SUMMARY - WEIGHT AND CENTER OF GRAVITY

CONFIGURATION	WEIGHT	HORIZONTAL		VERTICAL		% MAC
		ARM	MOMENT	ARM	MOMENT	
WEIGHT EMPTY - Gear Up	7541	248.4	1873188	113	855867	33.0
*GROSS WEIGHT CONDITIONS						
① 20 Minute Mission	9130	241.0	2200467	112	1024356	26.4
② 45 Minute Mission	9820	240.9	2366276	112	1104281	26.4
③ Design Gross Weight - 9200 Lbs.	9200	241.0	2217309	112	1032219	26.4
④ Design Gross Weight - 9200 Lbs. (Less Instrumentation)	9200	244.5	2249241	113	1037606	29.5
⑤ Full Fuel - Incl. Aux. Tank	11622	245.3	2850534	113	1318439	30.3

*Note: All conditions include 404 lbs. of standard instrumentation equipment unless otherwise noted.

All conditions are with the landing gear retracted.

Forward Center of Gravity Limit - Sta. 240, 25.56% Mac

Aft Center of Gravity Limit - Sta. 246, 30.87% Mac

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2.2 Group Weight Statement

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NAME
DATE

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U.S. ARMY
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LIFT-FAN FLIGHT RESEARCH AIRCRAFT

GROUP WEIGHT STATEMENT

- CALCULATED -
-CROSS OUT THOSE NOT APPLICABLE-

CONTRACT DA-44-177-EG-745

AIRPLANE-GOVERNMENT NUMBER 62-4505 and 62-4506

AIRPLANE-CONTRACTOR NUMBER

MANUFACTURED BY RYAN AERONAUTICAL COMPANY

ENGINE

MAIN

AUXILIARY

MANUFACTURED BY

GENERAL ELECTRIC

GENERAL ELECTRIC

MODEL

J85-GE-5E

X353-5B

NUMBER

2

2

PROPELLER

MAIN

AUXILIARY

MANUFACTURED BY

MODEL

NUMBER

AN 9103-D-TAB
NAME
DATE

GROUP WEIGHT STATEMENT
WEIGHT EMPTY

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1	WING GROUP					1047.46
2	CENTER SECTION-BASIC STRUCTURE				423.12	
3	INTERMEDIATE PANEL-BASIC STRUCTURE					
4	OUTER PANEL-BASIC STRUCTURE - INCL TIPS			LBS	144.00	
5						
6	SECONDARY STRUCTURE - INCL WINGFOLD MECH			LBS	343.53	
7	AILERONS - INCL BALANCE WEIGHT		LBS		60.27	
8	FLAPS-TRAILING EDGE				76.54	
9	-LEADING EDGE					
10	SLATS					
11	SPOILERS					
12	SPEEDBRAKES					
13						
14						
15	TAIL GROUP					237.79
16	STABILIZER-BASIC STRUCTURE				69.65	
17	FINS-BASIC STRUCTURE-INCL DORSAL	3.15	LBS		83.52	
18	SECONDARY STRUCTURE-STABILIZER & FINS				8.87	
19	ELEVATOR - INCL BALANCE WEIGHT	21.28	LBS		43.32	
20	RUDDERS - INCL BALANCE WEIGHT	12.21	LBS		32.43	
21						
22						
23	BODY GROUP					1264.88
24	FUSELAGE OR HULL-BASIC STRUCTURE				794.54	
25	BOOMS-BASIC STRUCTURE					
26	SECONDARY STRUCTURE-FUSELAGE OR HULL				148.50	
27	-BOOMS					
28	-SPEEDBRAKES					
29	-DOORS, PANELS & MISC				321.84	
30						
31	ALIGHTING GEAR GROUP-LAND - TYPE					420.14
32	LOCATION	*ROLLING	STRUCT	CONTROLS		
33		ASSEMBLY				
34	MAIN	75.70	221.07	59.56	354.33	
35	NOSE	20.17	38.83	6.81	65.81	
36						
37						
38						
39	ALIGHTING GEAR GROUP-WATER					
40	LOCATION	FLOATS	STRUTS	CONTROLS		
41						
42						
43						
44						
45	SURFACE CONTROLS GROUP					380.40
46	COCKPIT CONTROLS				22.49	
47	AUTOMATIC STABILIZATION SYSTEM				39.24	
48	SYSTEM CONTROLS - INCL POWER & FEEL CONT			LBS	131.86	
49	VERTICAL TAKE-OFF CONTROLS				186.81	
50	ENGINE SECTION OR NACELLE GROUP					44.39
51	INBOARD					
52	CENTER				44.39	
53	OUTBOARD					
54	DOORS, PANELS & MISC					
55						
56	PAGE TOTAL					
57						3395.06

* WHEELS, BRAKES, TIRES, TUBES AND AIR

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NAME
DATE

GROUP WEIGHT STATEMENT
WEIGHT EMPTY

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1	PROPULSION GROUP		LIFT	PITCH		3435.85
2			X FAN	FAN XX	MAIN X	
3	ENGINE INSTALLATION		1624.44	116.67		923.00
4	AFTERBURNERS-IF FURN SEPARATELY					
5	ACCESSORY GEAR BOXES & DRIVES					28.24
6	SUPERCHARGER FOR TURBO TYPES					
7	AIR INDUCTION SYSTEM		122.10	139.38		57.73
8	EXHAUST SYSTEM			55.09		212.88
9	COOLING SYSTEM					
10	LUBRICATING SYSTEM					
11	TANKS					
12	COOLING INSTALLATION					
13	DUCTS, PLUMBING, ETC					
14	FUEL SYSTEM					
15	TANKS-PROTECTED					
16	-UNPROTECTED					61.42
17	PLUMBING, ETC					50.71
18	WATER INJECTION SYSTEM					
19	ENGINE CONTROLS					38.11
20	STARTING SYSTEM					6.08
21	PROPELLER INSTALLATION					
22						
23	SUB-TOTAL - PROPULSION		1746.54	311.14		1378.17
24	AUXILIARY POWER PLANT GROUP					
25	INSTRUMENTS & NAVIGATIONAL EQUIPMENT GROUP					71.09
26	HYDRAULIC & PNEUMATIC GROUP					111.48
27						
28						
29	ELECTRICAL GROUP					194.05
30	AC SYSTEM					5.80
31	DC SYSTEM					188.25
32	ELECTRONICS GROUP					38.99
33	EQUIPMENT					37.77
34	INSTALLATION					1.22
35						
36	ARMAMENT GROUP - INCL GUNFIRE PROTECTION				LBS	
37	FURNISHINGS & EQUIPMENT GROUP					231.28
38	ACCOMMODATIONS FOR PERSONNEL					188.51
39	MISCELLANEOUS EQUIPMENT					9.66
40	FURNISHINGS					
41	EMERGENCY EQUIPMENT					33.11
42						
43	AIR CONDITIONING & ANTI-ICING EQUIPMENT GROUP					30.94
44	AIR CONDITIONING					29.82
45	ANTI-ICING					1.12
46						
47	PHOTOGRAPHIC GROUP					
48	AUXILIARY GEAR GROUP					27.20
49	HANDLING GEAR					.49
50	ARRESTING GEAR					
51	CATAPULTING GEAR					
52	ATO GEAR					
53	SPIN CHUTE					26.71
54	MANUFACTURING VARIATION					5.06
55						
56	PAGE TOTAL					4145.91
57	TOTAL-WEIGHT EMPTY - PG 2-3					7541.00

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GROUP WEIGHT STATEMENT
USEFUL LOAD & GROSS WEIGHT

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1	LOAD CONDITION		20 Min.	45 Min.	Max.
2			Mission	Mission	Fuel
3	CREW - NO. (1)		180	180	180
4	PASSENGERS - NO.				
5	FUEL	TYPE			
6	UNUSABLE	JP-4	45	45	55
7	INTERNAL - MAIN FWD.		472	817	1703
8	- MAIN AFT		473	818	870
9	- AUXILIARY AFT				819
10	EXTERNAL				3447
11					
12	BOMB BAY				
13					
14	OIL				
15	TRAPPED		3	3	3
16	ENGINE		12	12	12
17					
18	FUEL TANKS-LOCATION -AUX.				35
19	WATER INJECT. FLUID	GALS			
20					
21	BAGGAGE				
22	CARGO				
23	INSTRUMENTATION		404	404	404
24	ARMAMENT				
25	GUNS-LOCATION	FIX/FLEX QUANTITY CALIBER			
26					
27					
28					
29					
30					
31					
32	AMMUNITION				
33					
34					
35					
36					
37					
38					
39	INSTALLATIONS-BOMB, TORPEDO, ROCKET, ETC				
40*	BOMB OR TORPEDO RACKS				
41					
42					
43					
44					
45					
46	EQUIPMENT				
47	PYROTECHNICS				
48	PHOTOGRAPHIC				
49					
50*	OXYGEN				
51					
52	MISCELLANEOUS				
53					
54					
55	USEFUL LOAD		1589	2279	4081
56	WEIGHT EMPTY		7541	7541	7541
57	GROSS WEIGHTS - PG 2-4		9130	9820	11622

*IF NOT SPECIFIED AS WEIGHT EMPTY

1	LENGTH-OVERALL-FT	50.48 (Incl. Nose Boom)	HEIGHT-OVERALL	STATIC-FT	14.75	
2	MAIN FLOATS	AUX FLOATS	BOOMS	FUS OR HULL	X INBOARD	NACELLES CENTER OUTBOARD
4	LENGTH-MAX-FT			42.92		
5	DEPTH-MAX-FT			7.66		
6	WIDTH-MAX-FT			5.00		
7	WETTED AREA-SQ FT	(1216 TOTAL AIRPLANE)		627.00		
8	*FLOAT/HULL DISPL MAX LBS					
9	FUSELAGE VOLUME-CU FT	PRESSURIZED	NONE	TOTAL	735.0	
10				WING	H TAIL	V TAIL
11	GROSS AREA-SQ FT			260.32	52.86	51.00
12	WEIGHT/GROSS AREA-#/SQ FT			4.02	2.21	2.37
13	SPAN-FT			29.83	13.18	7.75 Approx.
14	FOLDED SPAN-FT					
15						
16	SWEEPBACK-AT 25% CHORD LINE-DEGREES			15.0&28.3	13.70	30.00
17	-AT % CHORD LINE-DEGREES					
18	**THEORETICAL ROOT CHORD	-LENGTH-INCHES		145.00	65.64	103.92
19		-MAX THICKNESS-INCHES		15.30	7.88	17.15
20	***CHORD AT PLANFORM BREAK	-LENGTH-INCHES		109.00		
21		-MAX THICKNESS-INCHES		14.38		
22	***THEORETICAL TIP CHORD	-LENGTH-INCHES		43.00	30.60	54.00
23		-MAX THICKNESS-INCHES		5.16	3.67	7.02
24	DORSAL AREA	-AREA-SQ FT				2.40
25	TAIL LENGTH-25% M.A.C. WING TO 25% M.A.C. H TAIL-FT			22.20		
26	AREA-SQ FT/AIRPLANE FLAPS L.E.			25.37		
27	LATERAL CONTROLS SLATS			SPOILERS	AILERONS	20.11
28	SPEED BRAKES WING			FUS/HULL		
29						
30						
31	ALIGHTING GEAR	LOCATION			MAIN	NOSE
32	LENGTH-OLEO EXT-C.L. AXLE TO C.L. TRUNNION-INCHES				65.00	38.35
33	OLEO TRAVEL-FULL EXT TO COLLAPSED-INCHES				9.20	8.0
34	FLOAT OR SKI STRUT LENGTH-INCHES					
35	ARRESTING HOOK LENGTH-C.L. HOOK TRUNNION TO C.L. HOOK POINT-INCHES					
36	HYDRAULIC SYSTEM CAPACITY-GALS	4.5				
37	FUEL & LUB SYST	NUMBER	****GALS	NUMBER	****GALS	
38	LOCATION TANKS	PROTECTED		TANKS	UNPROTECTED	
39	FUEL-INTERNAL WING					
40	FUS/HULL				522	
41	-EXTERNAL					
42	-BOMB BAY					
43						
44	OIL					
45						
46	STRUCTURAL DATA-CONDITION	WING		STRESS		ULT L.F.
47		FUEL-LBS		GROSS WT		
48	FLIGHT			9200		6.0
49	LANDING			9200		6.0
50	MAX GROSS WT WITH ZERO WING FUEL			9200		6.0
51	CATAPULTING					
52	MINIMUM FLYING WEIGHT			7693		6.0
53	LIMIT AIRPLANE LANDING SINKING SPEED-FT/SEC			9200		10
54	WING LIFT ASSUMED FOR LANDING DESIGN CONDITION-SW					
55	STALL SPEED-LANDING CONFIGURATION-POWER OFF-KNOTS					
56	PRESSURIZED CABIN-ULT DESIGN PRESSURE DIFFERENTIAL-FLIGHT P.S.I.					NONE
57	AIRFRAME WEIGHT-AS DEFINED IN AN-W-11 -LBS					

* LBS OF SEA WATER @ 64 LBS/CU FT
**PARALLEL TO & AT CENTERLINE AIRPL

*** PARALLEL TO CENTERLINE AIRPL
****TOTAL USABLE CAPACITY

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2.3 Detail Weight Statement

U.S. ARMY
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LIFT-FAN FLIGHT RESEARCH AIRCRAFT

DETAIL WEIGHT STATEMENT

- CALCULATED -
-CROSS OUT THOSE NOT APPLICABLE-

CONTRACT DA-44-177-TC-715

AIRPLANE-GOVERNMENT NUMBER 62-4505 & 62-4506

AIRPLANE-CONTRACTOR NUMBER

MANUFACTURED BY RYAN AERONAUTICAL COMPANY

ENGINE

MAIN

LIFT-FAN

MANUFACTURED BY

General Electric

General Electric

MODEL

J85-GE-5B

X353-5B

NUMBER

2

2

PROPELLER

MAIN

AUXILIARY

MANUFACTURED BY

MODEL

NUMBER

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DATE

WING GROUP
BASIC STRUCTURE

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					CENTER SECTION	INTERM PANEL	OUTER PANEL
1							
2							
3							
4	UPPER-FRONT SPAR CAP						
5	-INTERMEDIATE SPAR CAP						
6	-REAR SPAR CAP						
7	-AUXILIARY SPAR CAP						
8	-INTERSPAR COVER				17.29		56.04
9	-SPANWISE STIFFENERS						
10	-JOINTS, SPLICES & FAST.				8.81		
11	- BRACKETS-SKIN-SUPPORTING				5.18		
12							
13							
14	LOWER-FRONT SPAR CAP						
15	-INTERMEDIATE SPAR CAP						
16	-REAR SPAR CAP						
17	-AUXILIARY SPAR CAP						
18	-INTERSPAR COVER				25.07		
19	-SPANWISE STIFFENERS						
20	-JOINTS, SPLICES & FAST.				4.44		
21	-BRACKETS-SKIN SUPPORTING				6.90		
22	FRONT SPAR				94.34		14.79
23	REAR SPAR				88.50		13.55
24	SPAR WEB & STIFF.-FRONT						
25	-INTERMEDIATE						
26	-REAR						
27	-AUXILIARY						
28	-JOINTS, SPLICES & FAST.						
29	DOUBLERS- SKIN						3.90
30							
31	INTERSPAR-RIBS				4.42		29.82
32	-BULKHEADS				23.09		
33	-CHORDWISE STIFFENERS						
34	-JOINTS, SPLICES & FAST.				5.83		1.77
35	PAN RING				25.95		
36	LEADING EDGE-COVER				36.00		10.80
37	-STIFFENERS						
38	-RIBS				22.09		2.48
39	-AUXILIARY SPARS						
40	-JOINTS, SPLICES & FAST.				5.28		1.20
41							
42							
43	TRAILING EDGE-COVER				16.95		3.48
44	-STIFFENERS						
45	-RIBS				3.75		1.27
46	-AUXILIARY SPARS				1.58		
47	-JOINTS, SPLICES & FAST.				1.32		.15
48							
49							
50	TIPS						4.04
51	-						
52	FIREWALL-STRUCTURAL						
53	ATTACH FRGS.-WING TO FUS.				26.33		
54							
55	COLUMN TOTALS				423.12		144.00
56	TOTAL-BASIC STRUCTURE						567.12
57							

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NAME
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WING GROUP
SECONDARY STRUCTURE
DOORS, PANELS AND MISCELLANEOUS

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1	** *	X	XX	OPERATING MECHANISM					X
2	LO P AREA	STRUCT	MECH &	POWER	ACTUATOR	LOCK	EMERG		
3	SQ FT		CONTROLS	TRANS		MECH			
4									
5	WING FOLD								
6									
7									
8	DOORS & FRAMES								
9	-LANDING								
10									
11	-BOMB								
12									
13									
14	-GUN								
15									
16	-AMMUNITION								
17									
18	-ROCKET								
19									
20	-LIFE RAFT								
21									
22	-ESCAPE								
23									
24	-ACCESS	15.78							
25									
26	-FAN C.S.-H- 56.5	126.46	27.16	17.47	68.41	19.97			
27									
28	PANELS-NON STRUCTURAL								
29									
30	SEAL - FAN	12.70							
31									
32	SEAL - WE TO FLAP	1.64							
33									
34	INSULATION - EXTERNAL	28.99							
35									
36									
37									
38									
39									
40									
41									
42									
43									
44									
45									
46									
47									
48									
49	WALKWAYS, STEPS & GRIPS								
50									
51	FAIRING AND FILLETS	24.95							
52									
53	EXTERIOR FINISH								
54									
55	COLUMN TOTALS	210.52	27.16	17.47	68.41	19.97			
56	TOTAL-SECONDARY STRUCTURE								343.53
57									

* TYPE OF POWER- H-HYD, E-ELEC, P-PNEU, POWER TRANSMISSION FROM MAIN DISTRIBUTION POINT TO ACTUATING UNIT
** INDICATE LOCATION OF MAJOR DOORS- CS, OP, IP, ETC

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WING GROUP
CONTROL SURFACES

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1	X	AILERONS	XX	T.E. FLAPS	XX	L.E. FLAPS	X
2							
3		INBOARD	OUTBOARD	INBOARD	OUTBOARD	INBOARD	OUTBOARD
4							
5	SPARS		5.60	8.95			
6							
7	STRINGERS			1.48			
8							
9	RIBS		8.81	14.00			
10							
11							
12	COVER AND STIFFENERS		9.77	34.35			
13							
14							
15	T.E. STRIPS		.42	1.80			
16							
17	FABRIC AND DOPE						
18							
19	WIPS		1.80				
20							
21	TABS - STRUCTURE		8.11				
22	TABS - BALANCE WEIGHTS		3.58				
23							
24							
25	TORQUE TUBES						
26							
27							
28							
29	BALANCE WEIGHTS & SUPPORTS						
30							
31	AERODYNAMIC SEALS		1.66				
32							
33							
34	CONTROL HORNS						
35	ACTUATOR ATTACH STRUCT.			2.48			
36							
37	ACCESS DOORS-NON STRUCT		.69				
38							
39	HINGES AND PINS		1.38	7.23			
40	EXTERIOR FINISH						
41	TOTALS-SURFACE						
42							
43	CONTROL SURFACE SUPPORTS						
44	HINGES		14.12	4.85			
45	BRACKETS		4.33	1.40			
46	TRACKS						
47	CARRIAGES						
48							
49							
50							
51							
52							
53							
54	TOTALS-SUPPORTS						
55	COLUMN TOTALS		60.27	76.54			
56	PAGE TOTAL						136.81
57							1047.46

AN 9102-D-TAB
NAME
DATE

TAIL GROUP
BASIC STRUCTURE

PAGE 29
MODEL
REPORT 63B123

	X STABILIZER XX		FINS		DORSAL
	CENTER	OUTER	CENTER	OUTER	
1					
2					
3					
4	UPPER-FRONT SPAR CAP				
5	-INTERMEDIATE SPAR CAP				
6	-REAR SPAR CAP				
7	-AUXILIARY SPAR CAP				
8	-INTERSPAR COVER	20.24	25.76		1.54
9	-SPANWISE STIFFENERS				
10	-JOINTS, SPLICES & FAST.				.63
11					
12	FRAMES				.88
13					
14	LOWER-FRONT SPAR CAP				
15	-INTERMEDIATE SPAR CAP				
16	-REAR SPAR CAP				
17	-AUXILIARY SPAR CAP				
18	-INTERSPAR COVER				
19	-SPANWISE STIFFENERS				
20	-JOINTS, SPLICES & FAST.				
21	FRONT SPAR	2.73	4.07		
22	CENTER SPAR	8.43	10.23		
23	REAR SPAR	3.44	3.01		
24	SPAR WEB & STIFF.-FRONT				
25	-INTERMEDIATE				
26	-REAR				
27	-AUXILIARY				
28	-JOINTS, SPLICES & FAST.				
29					
30					
31	INTERSPAR-RIBS	13.30	20.71		
32	-BULKHEADS				
33	-CHORDWISE STIFFENERS				
34	-JOINTS, SPLICES & FAST.	2.15			
35					
36	LEADING EDGE-COVER	6.24	4.67		
37	-STIFFENERS				
38	-RIBS	2.48	2.99		
39	-AUXILIARY SPARS				
40	-JOINTS, SPLICES & FAST.				
41					
42					
43	TRAILING EDGE-COVER				
44	-STIFFENERS	.05	.68		
45	-RIBS	.66	.28		
46	-AUXILIARY SPARS				
47	-JOINTS, SPLICES & FAST.				
48					
49	FIBERGLASS FAIRING	3.99	4.96		
50	TIPS	4.26			
51	ACTUATOR FITTING	.29	.42		
52	MT. PLANE				
53	PIVOT FITTING	1.39	2.59		
54	EXTERIOR FINISH				.10
55	COLUMN TOTALS	69.65	80.37		3.15
56	TOTAL-BASIC STRUCTURE				153.17
57					

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NAME
DATE

TAIL GROUP
SECONDARY STRUCTURE
DOORS, PANELS AND MISCELLANEOUS

PAGE 31
MODEL
REPORT 63B123

1	** *	X	XX	OPERATING MECHANISM					X
2	LO P AREA	STRUCT	MECH &	POWER	ACTUATOR	LOCK	EMERG		
3	SQ FT		CONTROLS	TRANS		MECH			
4									
5	DOORS & FRAMES								
6	-LANDING								
7									
8									
9									
10	-ACCESS								
11	- VERTICAL	2.60							
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									
26									
27									
28	PANELS-NON STRUCTURAL								
29									
30									
31									
32	AERO SEAL ATTACH - HORIZ.	.91							
33	AERO SEAL ATTACH - VERT.	.41							
34									
35									
36									
37									
38									
39									
40									
41									
42									
43									
44									
45									
46									
47									
48									
49	WALKWAYS, STEPS & GRIPS								
50	FAIRING AND FILLETS								
51									
52									
53	EXTERIOR FINISH -HORIZ.	2.96							
54	" " -VERT.	1.99							
55	COLUMN TOTALS	8.87							
56	TOTAL-SECONDARY STRUCTURE								8.87
57									

* TYPE OF POWER- H-HYD, E-ELEC, P-PNEU, POWER TRANSMISSION FROM MAIN DISTRIBUTION POINT TO ACTUATING UNIT
** INDICATE LOCATION OF MAJOR DOORS- CS, OP, IP, ETC

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NAME
DATE

TAIL GROUP
CONTROL SURFACES

PAGE 33
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				X	XX	RUDDERS	
					ELEVATION	CENTER	OUTER
1							
2							
3							
4	SPARS				2.14	4.55	
5							
6							
7							
8	RIBS				2.44	1.83	
9	RIB ATTACH ANGLES					.11	
10							
11							
12	COVER AND STIFFENERS				8.70	4.02	
13							
14							
15	T.E. STRIPS				.60	.24	
16							
17	FABRIC AND DOPE						
18							
19							
20							
21	TABS					1.88	
22							
23							
24							
25	TORQUE TUBES				3.15	3.48	
26							
27							
28							
29	BALANCE WEIGHTS & SUPPORTS				21.28	12.21	
30							
31	AERODYNAMIC SEALS				1.23	.84	
32							
33							
34	CONTROL HORNS						
35							
36							
37	ACCESS DOORS-NON STRUCT				.38	.53	
38							
39	HINGES AND PINS				1.50	.96	
40	EXTERIOR FINISH						
41							
42	TOTALS-SURFACE						
43							
44	CONTROL SURFACE SUPPORTS						
45	HINGES				1.90	.69	
46	BRACKETS					.77	
47	ACTUATOR					.32	
48							
49							
50							
51							
52							
53							
54	TOTALS-SUPPORTS						
55	COLUMN TOTALS				43.32	32.43	
56	PAGE TOTAL						75.75
57	TOTAL-TAIL GROUP - PG 6-8						237.79

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NAME
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BODY GROUP
BASIC STRUCTURE

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MODEL
REPORT 63B123

1	X	FUSELAGE OR HULL	XX BOOMS
2			
3	STATION		
4	*BULKHEADS & FRAMES		
5	FRONT HINGE FRAME	3.92	
6	REAR HINGE FRAME	12.30	
7			
8	FRAME - STA. 91	12.48	
9	BULKHEAD - STA. 214	47.13	
10	CANTED BULKHEAD - STA. 146	27.74	
11	BULKHEAD - STA. 165.2	14.46	
12	FRAME - ENGINE SUPT+ 214	13.65	
13	BULKHEAD - M.L.G. DRAG STRUT	20.25	
14			
15	BULKHEAD - M.L.G. STA. 287	20.06	
16	BULKHEAD - WING SPAR - 296	39.49	
17			
18			
19			
20	BULKHEAD - STAB FRONT SPAR	5.12	
21	- STAB CTR SPAR	6.30	
22	- STAB REAR SPAR	3.44	
23	TRUSS STRUCTURE	108.80	
24	MINOR FRAMES	97.99	
25	JOINTS, SPLICES, FASTENERS	19.51	
26	OVERTURN STRUCTURE		
27	VERTICAL STIFFENERS	2.59	
28	COVER-UPPER BETWEEN LONGN	25.33	
29	-SIDE BETWEEN LONGERONS	50.31	
30	-LOWER BETWEEN LONGERONS	21.30	
31	HORIZONTAL STIFFENERS	4.51	
32	COVER LONGL STIFF.-UPPER		
33	-SIDE	8.76	
34	-LOWER		
35	WING L.E. ATTACH FIGS.	.78	
36	DRAG ANGLE - FUS. TO FIN	4.99	
37	LONGERONS-UPPER	36.55	
38	LONGERONS-LOWER	40.43	
39	LONGERON - UPPER EXTERNAL	8.04	
40	HORIZ. SHEAR WEBS	65.02	
41	LONGITUDINAL PARTITIONS		
42			
43	FLOORING AND SUPPORTS	21.21	
44	NOSE WHEEL WELL	12.89	
45	MAIN GEAR DOOR SUPPORT	21.18	
46			
47	FIREWALL-STRUCTURAL		
48	PITCH FAN MOUNT STRUCTURE	15.63	
49	KEELSONS	1.32	
50	KEEL		
51	MISCELLANEOUS	1.08	
52	CHINE AND SPRAY STRIPS		
53	STEP ASSEMBLY		
54	STAIRWAYS-STRUCTURAL		
55	COLUMN TOTALS	794.54	
56	TOTAL-BASIC STRUCTURE		794.54
57			

* LIST ALL MAIN & WATERTIGHT BULKHEADS & FRAMES INDIVIDUALLY. MINOR FRAMES MAY BE COMBINED.

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NAME
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BODY GROUP
SECONDARY STRUCTURE

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MODEL
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1	X	FUSELAGE OR HULL	XX	XX	X
2				BOOMS	SPEED
3					BRAKES
4		ENCLOSURE-EXCL TURRET ENC			
5		CANOPY	61.87		
6		CANOPY-OPERATING MECH			
7		-RAILS			
8*		-CYLINDERS & PLUMBING			
9		-FLUID			
10		-HINGE STRUCTURE	4.25		
11		-LATCH STRUCTURE	.78		
12					
13		GUNNER-TAIL			
14					
15		BOMBARDIER			
16		SIGHTING BLISTERS			
17					
18		WINDSHLD-EXCL BULLET PROT	53.94		
19					
20		WINDOWS, PORTS-INCL FRAMES			
21					
22		HEAT SHIELDING	2.21		
23					
24					
25					
26					
27					
28		FLOORING AND SUPPORTS			
29					
30					
31		STAIRWAYS & LADDERS-FIXED			
32					
33		JACK PAD PROVISIONS	1.07		
34		STERNPOST AND FITTINGS			
35		NOSE BUMPER-HULL			
36		RUBBING STRIPS			
37					
38		NOSE CONE	14.85		
39					
40		TAIL CONE	8.06		
41		TAIL BUMPER	1.47		
42					
43		SPEED BRAKES-STRUCTURE			
44		-SUPPORTS			
45					
46					
47					
48					
49					
50					
51					
52					
53					
54					
55		COLUMN TOTALS	148.50		
56		PAGE TOTAL			148.50
57					

* FROM MAIN DISTRIBUTION POINT TO ACTUATING UNIT.

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BODY GROUP
SECONDARY STRUCTURE
DOORS, PANELS AND MISCELLANEOUS

PAGE 39
MODEL
REPORT 63B123

1	** *	X	XX	OPERATING MECHANISM				X
2	LO P AREA	STRUCT	MECH &	POWER	ACTUATOR	LOCK	EMERG	
3	SQ FT		CONTROLS	TRANS		MECH		
4								
5	DOORS & FRAMES							
6	-LANDING - NOSE F-Ø-5.66	6.22	4.00					
7	-LANDING - MAIN F-H-28.1	50.23	4.85	3.71	32.96			
8								
9								
10	-BOMB							
11								
12								
13	-GUN							
14								
15	-AMMUNITION							
16								
17	-ROCKET							
18								
19	-LIFE RAFT							
20								
21	-ESCAPE							
22								
23								
24	-WATERTIGHT							
25								
26	-COMPARTMENT							
27								
28	-ENTRANCE							
29								
30								
31	-ACCESS	6.26						
32	-ACCESS - STA. 100 TO 133	7.36						
33	-SPIN CHUTE	2.31						
34	ACCESS - ELECT. COMPT.	5.34						
35	-ENGINE							
36								
37	-CAMERA							
38								
39	PANELS-NON STRUCTURAL							
40	-ENGINE ACCESS	47.52						
41	-SIDE 214 TO 287	36.30						
42	-LOWER 165 TO 276	60.14						
43								
44	-M.L.G. WHEEL WELL	3.28						
45								
46	-SEAL FUS. TO CANOE	2.65						
47	-CLOSURE - PITCH FAN	2.81						
48								
49	WALKWAYS, STEPS & GRIPS							
50	FAIRING - TAILPIPE EXIT	16.04						
51	FAIRING AND FILLETS							
52	EXTERIOR FINISH	5.59						
53								
54	INSULATION - EXTERNAL	24.27						
55	COLUMN TOTALS	276.32	8.85	3.71	32.96			
56	PAGE TOTAL							321.84
57	TOTAL-BODY GROUP - PG 9-11							1264.88

* TYPE OF POWER- H-HYD, E-ELEC, P-PNEU, POWER TRANSMISSION FROM MAIN DISTRIBUTION POINT TO ACTUATING UNIT

** INDICATE LOCATION OF MAJOR DOORS- B-BOOM, F-FUSELAGE, H-HULL.

Ø MECHANICAL LINKAGE TO GEAR

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NAME
DATE

ALIGNING GEAR GROUP

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MODEL
REPORT 63B123

1TYPE	MAIN		NOSE			
2						
3	LOCATION					
4						
5	QUANTITY					
6WHEELS	28.90		9.22			
7TIRES	23.70		10.95			
8TUBES						
9AIR						
10BRAKES	21.10					
11						
12						
13ANTI-SKID DEVICE						
14						
15FLOATS-BULKHEADS						
16 -FRAMES						
17 -COVER						
18 -COVER STIFF.-LONG						
19 -KEELSONS						
20 -KEEL						
21 -LONGITUDINAL PARTITIONS						
22 -CHINE, SPRAY STRIP						
23 -STEP ASSEMBLY						
24 -POST ASSEMBLY						
25 -NOSE BUMPER						
26INSPECTION DOORS						
27WALKWAYS						
28EXTERIOR FINISH						
29SKIDS OR BUMPERS						
30SKIS						
31						
32TOTALS-RUNNING GEAR	(73.70)		(20.17)			
33 SHOCK STRUT-OIL-DAMPER			27.75			
34STRUTS-DRAG	34.83		7.14			
35 -SIDE	10.10					
36 -VEE BRACE	15.09					
37PYLON						
38SHOCK STRUT-STRUT	79.14					
39 -STRUT OIL	3.40					
40 -FORK						
41 -AXLE						
42 -TORQUE ARMS	5.66					
43 -TRUNNIONS						
44SHIMMY DAMPER OR SNUBBER						
45 TWO POSITION LINKAGE	25.86					
46FITTINGS-MAIN ATTACH-WING						
47 -TAIL						
48 -BODY	45.22		3.94			
49 -NACELLE						
50						
51FAIRING						
52GROUND FEELER PROBE	.62					
53MISCELLANEOUS						
54PINS, BOLTS, NUTS, ETC	1.15					
55COLUMN TOTALS	294.77		59.00			
56PAGE TOTAL						353.77
57						

TIRE SIZE: MAIN; 20 X 4.4 NOSE: 18 X 4.4
BRK ENERGY FT#/1000/AIRPL 2,800 NORMAL
BRAKE TYPE: SINGLE DISK

3,900 RTO

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NAME
DATE

ALIGHTING GEAR GROUP
CONTROLS
MAIN GEAR

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MODEL
REPORT 63B123

1 LOCATION	X	XX				Two
2		RETRACT	BRAKE OPER	EMERG EXTEN	RETRACT	EMERG EXTEN
3						Position- ing Con- trols
4						
5						
6 MECHANICAL OPERATING MECH						
7 CONTROLS			4.92			
8 ACTUATORS						
9						
10						
11						
12 ELECTRICAL OPERATING MECH						
13 CONTROLS	1.04					
14* CIRCUITRY	3.37			.24		1.13
15 OPERATING MOTORS						
16 MECHANISM						
17						
18						
19						
20 HYDRAULIC OPERATING MECH						
21 CONTROLS						
22* PLUMBING	3.97	6.19				.47
23 SELECTOR VALVES	1.36					1.34
24 SEQUENCE VALVES	.68					
25 ACCUMULATORS						
26 ACTUATORS	7.06					7.40
27 MECHANISM						
28* FLUID	.04	.24				.08
29						
30						
31 PNEUMATIC OPERATING MECH						
32 CONTROLS			1.65			
33* PLUMBING			3.69			
34 PUMPS						
35 BOTTLES-AIR						
36 ACTUATORS						
37 MECHANISM						
38 UPLATCH OPER. MECH.						
39 ACTUATOR	.97					
40 MECHANISM & PLUMBING	7.82					
41 LOCKING MECHANISM						
42 BRACES						
43 LINKS						
44 PARKING BRAKE CONTROL						
45 POSITION INDICATING MECH	3.88					
46						
47						
48 SUPTS. GUIDES, ETC-WING						
49 -TAIL						
50 -BODY	.17	1.30	.40			.15
51 -NACELLE						
52						
53						
54						
55 COLUMN TOTALS	30.36	12.65	5.98			10.57
56 PAGE TOTAL						59.56
57						

* FROM MAIN DISTRIBUTION POINT TO ACTUATING UNIT.

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NAME
DATE

ALIGHTING GEAR GROUP
CONTROLS
CONTD
NOSE GEAR

PAGE 45
MODEL
REPORT 68B123

1	LOCATION	X	XX				
2				BRAKE	EMERG		EMERG
3		STEERING	RETRACT	OPER	EXTEN	RETRACT	EXTEN
4							
5							
6	MECHANICAL OPERATING MECH						
7	CONTROLS						
8	ACTUATORS						
9							
10							
11							
12	ELECTRICAL OPERATING MECH						
13	CONTROLS						
14*	CIRCUITRY		.77		.26		
15	OPERATING MOTORS						
16	MECHANISM						
17							
18							
19							
20	HYDRAULIC OPERATING MECH						
21	CONTROLS						
22*	PLUMBING		2.81				
23	PUMPS						
24	RESERVOIRS						
25	ACCUMULATORS						
26	ACTUATORS		2.18				
27	MECHANISM						
28*	FLUID		.10				
29							
30							
31	PNEUMATIC OPERATING MECH						
32	CONTROLS						
33*	PLUMBING				.28		
34	PUMPS						
35	BOTTLES-AIR						
36	ACTUATORS						
37	MECHANISM						
38							
39							
40							
41	LOCKING MECHANISM						
42	BRACES						
43	LINKS						
44	PARKING BRAKE CONTROL						
45	POSITION INDICATING MECH		.32				
46							
47							
48	SUPTS, GUIDES, ETC-WING						
49	-TAIL						
50	-BODY		.09				
51	-NACELLE						
52							
53							
54							
55	COLUMN TOTALS		6.27		.54		
56	PAGE TOTAL						6.81
57	TOTAL-ALIGHTING GEAR GROUP - PG 12-14						420.14

* FROM MAIN DISTRIBUTION POINT TO ACTUATING UNIT.

					COCKPIT CONTROLS	AUTO- PILOT
1						
2						
3						
4	CONTROL COLUMN OR STICK					
5	-PILOT				3.67	
6	-ASSISTANT PILOT					
7	-CONNECTING MEMBERS				5.62	
8	-SUPPORTS					
9						
10						
11						
12						
13	RUDDER PEDALS & BRK TREAD					
14	-PILOT				6.26	
15	-ASSISTANT PILOT					
16	-CONNECTING MEMBERS					
17	-SUPPORTS				.12	
18	-ADJUSTING MECHANISM				1.40	
19	LIFT STICK				5.04	
20	LIFT STICK MECHANISM				.38	
21						
22						
23	INTEGRAL PARKING LOCK					
24	CONTROL STICK					
25	RUDDER PEDALS					
26	SURFACES					
27						
28						
29						
30						
31						
32						
33	AUTOPILOT-TYPE-					
34	CONTROLLER					
35	TRANSMITTER					
36	SERVO AMPLIFIER					
37	SERVO MOTORS					
38	GYROS					
39						
40	AUTO STABILIZATION SYSTEM					
41	CONTROLLER					29.19
42	ELECTRICAL CIRCUITRY					10.05
43						
44						
45						
46	SUPPORTS AND BRACKETS					
47						
48*	PLUMBING					
49*	FLUID					
50*	ELEC PANELS & CIRCUITRY					
51	PULLEYS, SPROCKETS, ETC					
52						
53						
54						
55	COLUMN TOTALS				22.49	39.24
56	TOTAL-COCKPIT CONTROLS & AUTOPILOT					61.73
57						

* FROM MAIN DISTRIBUTION POINT TO ACTUATING UNIT.

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SURFACE CONTROLS GROUP
SYSTEM CONTROLS
CONVENTIONAL

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MODEL
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1						
2						
3		AILERON	ELEVATOR	RUDDER	T.E. FLAPS	HORIZONTAL SPEED STABILIZER BRAKES
4						
5	MECHANICAL OPERATING MECH	16.93	5.25	3.42		
6	CONTROLS		7.61	6.74		
7	TENSION REGULATORS		4.20	4.12		
8	ACTUATORS					
9	TRIM CONTROLS					
10						
11	ELECTRICAL OPERATING MECH					
12	**TYPE					
13	CONTROLS					
14	* CIRCUITRY	.40		.75	2.52	5.18
15	OPERATING MOTORS				15.22	
16	MECHANISM					
17	TRIM CONTROLS	1.58		1.57		.05
18						
19	HYDRAULIC OPERATING MECH					
20	**TYPE	"B"				"P"
21	CONTROLS					
22	* PLUMBING	3.29				14.77
23	PUMPS					
24	RESERVOIRS					
25	ACCUMULATORS					
26	ACTUATORS	6.30				12.60
27	MECHANISM					
28	TRIM CONTROLS					
29	* FLUID	.39				1.63
30						
31	PNEUMATIC OPERATING MECH					
32	**TYPE					
33	CONTROLS					
34	* PLUMBING					
35	PUMPS					
36	BOTTLES-AIR					
37	ACTUATORS					
38	MECHANISM					
39	TRIM CONTROLS					
40						
41	ARTIFICIAL FEEL					
42	BUNGEE					
43	BOB WEIGHT					
44	AILERON DROOP SYSTEM					
45	MECHANICAL COMPONENTS	3.37				
46	ELECTRICAL ACTUATOR	1.24				
47	CIRCUITRY	.32				
48	SUPPORTS, GUIDES, ETC-WING	2.73				
49	-TAIL					.29
50	+BODY	1.32	3.84	2.24	1.17	.12
51	-NACELLE					
52						
53						
54						
55	COLUMN TOTALS	37.87	20.90	19.54	18.91	34.64
56	PAGE TOTAL					131.86
57						

* FROM MAIN DISTRIBUTION POINT TO ACTUATING UNIT.
** TYPE- ADD P-POWERED OR B-BOOST.

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SURFACE CONTROLS GROUP
SYSTEM CONTROLS
CONTD
V.T.O.L.

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MODEL
REPORT 63B123

1		PITCH	YAW	ROLL	LIFT	L.E. SLATS	COMMON
2							
3							
4							
5	MECHANICAL OPERATING MECH	10.83	1.26	.40	19.65		34.94
6	CONTROLS						
7	TENSION REGULATORS						
8	ACTUATORS						
9	TRIM CONTROLS						
10							
11	ELECTRICAL OPERATING MECH						
12	**TYPE						
13	CONTROLS	3.70					
14	* CIRCUITRY	.35	.32	.26	.58		6.64
15	OPERATING MOTORS				2.74		
16	MECHANISM						
17	TRIM CONTROLS	.81	.97	.86			
18	CIRCUITRY-INTERLOCK						14.68
19	HYDRAULIC OPERATING MECH						
20	**TYPE						
21	CONTROLS						
22	* PLUMBING	5.91			8.36		
23	PUMPS						
24	RESERVOIRS						
25	ACCUMULATORS						
26	ACTUATORS	9.60			24.54		
27	MECHANISM						
28	TRIM CONTROLS						
29	* FLUID	.81			.87		
30							
31	PNEUMATIC OPERATING MECH						
32	**TYPE						
33	CONTROLS						
34	* PLUMBING						
35	PUMPS						
36	BOTTLES-AIR						
37	ACTUATORS						
38	MECHANISM						
39	TRIM CONTROLS						
40							
41	ARTIFICIAL FEEL						
42	BUNGEE						
43	BOB WEIGHT						
44	ELECTRICAL MIXER						27.04
45							
46							
47							
48	SUPPORTS, GUIDES, ETC-WING				6.80		
49	-TAIL						
50	-BODY	3.37			.08		.44
51	-NACELLE						
52							
53							
54							
55	COLUMN TOTALS	35.38	2.55	1.52	63.62		83.74
56	PAGE TOTAL						186.81
57	TOTAL-SURFACE CONTROLS GROUP - PG 15-17						380.40

* FROM MAIN DISTRIBUTION POINT TO ACTUATING UNIT.
** TYPE- ADD P-POWERED OR B-BOOST.

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DATE

ENGINE SECTION
OR
NACELLE GROUP

PAGE 53
MODEL
REPORT 63B123

1									
2									
3						INBOARD	CENTER	OUTBOARD	
4	ENGINE MOUNT						14.34		
5									
6	SUPPORT BAY								
7	VIBRATION ABSORBERS								
8									
9									
10	NACELLE STRUCTURE								
11	BULKHEADS AND FRAMES								
12	COVER AND STIFFENERS								
13	FITTINGS								
14	LONGERONS								
15	ATTACHING ANGLES, ETC								
16									
17									
18									
19	PYLON AND STRUTS								
20									
21									
22									
23	*FIREWALL						30.05		
24									
25	FIRE PROTECTION SHROUDS								
26									
27	COWLING								
28	ENGINE COWL								
29									
30									
31									
32									
33									
34									
35	BAFFLES								
36	ACCESSORY COWL OR SKIRT								
37	COWL FLAPS								
38	COWL FLAP CONT & MECH								
39									
40									
41									
42									
43									
44									
45	FAIRING-NAC TO WING-PYLON								
46	STEPS AND GRIPS								
47	WORKING PLATFORMS-BUILT IN								
48	INTERNAL WALKWAYS								
49									
50									
51	INSTALLATION HARDWARE								
52									
53									
54									
55	COLUMN TOTALS						44.39		
56	PAGE TOTAL								44.39
57									

* IF IN NACELLE OR NON STRUCTURAL IN WING OR BODY

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DATE

PROPULSION GROUP
MAIN

GAS GENERATOR

PAGE 55
MODEL
REPORT 63B123

	ENGINE INSTL	GEAR BOX & DRIVES	SUPER- CHARGER	AIR INDUCT.	EXHAUST SYSTEM	COOLING SYSTEM
1						
2						
3						
4	ENGINE INSTALLATION					
5	* ENGINE & DIVERTER VALVE	923.00				
6	AFTERBURNER					
7	* ENGINE AND AFTERBURNER					
8	REDUCTION GEAR BOX					
9	EXTENSION DRIVE SHAFT					
10						
11	ACCESS, GEAR BOX & DRIVES	19.60				
12	DRIVE SHAFT	8.64				
13	SUPERCHARGER-FOR TURBOS					
14	LUBRICATING SYSTEM					
15	SUPPORTS					
16	CONTROLS					
17	PIPING-EXH TO SUPCHGR					
18						
19	AIR INDUCTION SYSTEM					
20	INTERCOOLERS & SUPPORTS					
21	AIR DUCTS AND SHROUDING			56.28		
22	INTAKE DOORS & CONTROLS					
23	AIR FILTERS					
24	SCREENS AND CONTROLS					
25	COMPRESSOR BLEED DUCT			1.45		
26						
27						
28	EXHAUST SYSTEM					
29	EXHAUST STACKS					
30	EXHAUST COLLECTORS					
31	COLLECTOR OR ENG SHROUD					
32	TAILPIPE				148.90	
33	TAILPIPE SHROUD & INSUL				50.67	
34	TAIL CONE					
35	SILENCING DEVICES					
36	SUPPORTS, BRACKETS, ETC				.30	
37	THRUST SPOILER DOORS				7.57	
38	THRUST SPOILER LINKAGE				5.44	
39	COOLING SYSTEM					
40	RADIATOR AND SUPPORTS					
41	SHUTTERS, SCOOPS, DUCTS					
42	EXPANSION TANK & SUPTS					
43	LIQ IN SYSTEM- GAL					
44	PIPING, VENTS, CLAMPS, ETC					
45						
46						
47	FANS					
48	CONTRAVANES					
49	FAN DRIVES					
50	CONTROLS & OPER MECH					
51						
52						
53						
54						
55	COLUMN TOTALS	923.00	28.24	57.73	212.98	
56	PAGE TOTAL					1221.85
57						

* AS INSTALLED WEIGHT

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DATE

PROPULSION GROUP
MAIN
LIFT FAN

PAGE 57
MODEL
REPORT 63B123

1		ENGINE	GEAR BOX	SUPER-	AIR	EXHAUST	COOLING
2		INSTL	& DRIVES	CHARGER	INDUCT.	SYSTEM	SYSTEM
3							
4	ENGINE INSTALLATION						
5	* FAN-X353-5B (2)	1616.38					
6	AFTERBURNER						
7	* ENGINE AND AFTERBURNER						
8	REDUCTION GEAR BOX						
9	EXTENSION DRIVE SHAFT						
10	FAN MOUNTS	8.06					
11	ACCESS. GEAR BOX & DRIVES						
12							
13	SUPERCHARGER-FOR TURBOS						
14	LUBRICATING SYSTEM						
15	SUPPORTS						
16	CONTROLS						
17	PIPING-EXH TO SUPCHGR						
18							
19	AIR INDUCTION SYSTEM						
20	INTERCOOLERS & SUPPORTS						
21	AIR DUCTS				100.28		
22	INTAKE DOORS & CONTROLS						
23	AIR FILTERS						
24	SCREENS AND CONTROLS						
25	INSULATION				6.79		
26	DUCT SUPPORTS				15.03		
27							
28	EXHAUST SYSTEM						
29	EXHAUST STACKS						
30	EXHAUST COLLECTORS						
31	COLLECTOR OR ENG SHROUD						
32	TAILPIPE						
33	TAILPIPE SHROUD & INSUL						
34	TAIL CONE						
35	SILENCING DEVICES						
36	SUPPORTS, BRACKETS, ETC						
37							
38							
39	COOLING SYSTEM						
40	RADIATOR AND SUPPORTS						
41	SHUTTERS, SCOOPS, DUCTS						
42	EXPANSION TANK & SUPTS						
43	LIQ IN SYSTEM- GAL						
44	PIPING, VENTS, CLAMPS, ETC						
45							
46							
47	FANS						
48	CONTRAVANES						
49	FAN DRIVES						
50	CONTROLS & OPER MECH						
51							
52							
53							
54							
55	COLUMN TOTALS	1624.44			122.10		
56	PAGE TOTAL						1746.54
57							

* AS INSTALLED WEIGHT

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PROPULSION GROUP
AUXILIARY
PITCH FAN

PAGE 59
MODEL
REPORT 63E123

1		ENGINE	GEAR BOX	SUPER-	AIR	EXHAUST	COOLING
2		INSTL	& DRIVES	CHARGER	INDUCT.	SYSTEM	SYSTEM
4	ENGINE INSTALLATION						
5*	FAN - X376 (1)	114.40					
6	AFTERBURNER						
7*	ENGINE AND AFTERBURNER						
8	REDUCTION GEAR BOX						
9	EXTENSION DRIVE SHAFT						
10	FAN SUPPORTS	2.27					
11	ACCESS, GEAR BOX & DRIVES						
12							
13	SUPERCHARGER-FOR TURBOS						
14	LUBRICATING SYSTEM						
15	SUPPORTS						
16	CONTROLS						
17	PIPING-EXH TO SUPCHGR						
18							
19	AIR INDUCTION SYSTEM						
20	INTERCOOLERS & SUPPORTS						
21	AIR DUCTS				78.70		
22	INTAKE DOORS				14.92		
23	AIR FILTERS						
24	SCREENS AND CONTROLS						
25	DUCT SHROUDING				20.66		
26	DUCT SUPPORTS				5.74		
27	BELLMOUTH				19.36		
28	EXHAUST SYSTEM						
29	EXHAUST STACKS						
30	EXHAUST COLLECTORS						
31	COLLECTOR OR ENG SHROUD						
32	TAILPIPE						
33	TAILPIPE SHROUD & INSUL						
34	TAIL CONE						
35	SILENCING DEVICES						
36	SUPPORTS, BRACKETS, ETC						
37	PITCH THRUST REVERSER					46.54	
38	THRUST REVERSER LINKAGE					8.55	
39	COOLING SYSTEM						
40	RADIATOR AND SUPPORTS						
41	SHUTTERS, SCOOPS, DUCTS						
42	EXPANSION TANK & SUPTS						
43	LIQ IN SYSTEM- GAL						
44	PIPING, VENTS, CLAMPS, ETC						
45							
46							
47	FANS						
48	CONTRAVANES						
49	FAN DRIVES						
50	CONTROLS & OPER MECH						
51							
52							
53							
54							
55	COLUMN TOTALS	116.67			139.38	55.09	
56	PAGE TOTAL						311.14
57							

* AS INSTALLED WEIGHT

** FOR ACTUATING MECHANISM & CONTROLS
SEE PAGE 17 "V.T.O.L. CONTROLS"

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PROPULSION GROUP
LUBRICATING AND FUEL SYSTEMS

PAGE 61
MODEL
REPORT 63B123

					X AUXILIARY XX		MAIN X	
					LUBRI- CATING	FUEL	LUBRI- CATING	FUEL
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
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44								
45								
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47								
48								
49								
50								
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52								
53								
54								
55								
56								
57								

* OIL COOLER-QTY

, SIZE

.

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PROPULSION GROUP
MAIN

PAGE 63
MODEL
REPORT 63B123

1							
2							
3							
4	WATER INJECTION SYSTEM				WATER INJECT.	ENGINE CONTROLS	STARTING SYSTEM
5	* TANKS						PROP INSTL
6	PUMPS						
7	METERING UNIT						
8	VALVES AND PLUMBING						
9	CONTROLS						
10							
11							
12	ENGINE CONTROLS						
13	IGNITION					.54	
14	THROTTLE					17.38	
15	DIVERTER VALVE					11.77	
16	***SUPERCHARGER						
17	AFTERBURNER						
18	THRUST SPOILER					8.42	
19							
20	STARTING SYSTEM - AIR IMPINGEMENT						6.08
21	POWER UNIT-TYPE						
22	STARTER-TYPE						
23	STARTER CONTROLS						
24	CRANK AND EXTENSION						
25	PRIMER AND PIPING						
26	MESHING SOLENOID						
27	CIRCUITRY						
28							
29							
30							
31							
32	PROPELLER INSTL-DIA						
33	PROPELLER-QTY						
34	CUFFS						
35	SPINNER						
36	CONTROLS-TYPE	GFAE					
37	SPEED						
38	PITCH						
39	FEATHER						
40	REVERSE						
41							
42							
43							
44							
45							
46							
47	**OIL	GAL					
48	**TANK AND PLUMBING						
49							
50							
51							
52							
53							
54							
55	COLUMN TOTALS					38.11	6.08
56	PAGE TOTAL						
57	TOTAL PROPULSION GROUP						44.19

* WATER TANKS-QTY , GAL PER TANK
** WHEN SEPARATE OIL SYSTEM IS USED.
***SUPERCHARGER INTEGRAL WITH ENGINE.

3435.85

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DATE

INSTRUMENT AND NAVIGATIONAL
EQUIPMENT GROUP
INSTRUMENTS

PAGE 65
MODEL
REPORT 63B123

1					X INSTRMT
2	FUNCTIONAL GROUPS			INDIC	TRANSM & AMPL
3	AND ITEMS	QTY		INSTL	POWER SYSTEM
4	ACCELEROMETER		.66		
5	MACHMETER		1.65	.39	
6	ALTIMETER		1.31		
7	ATTITUDE		2.86	.21	
8	AIR SPEED - LOW SPEED		.60		
9					
10					
11	TURN AND BANK		1.20	.11	
12	FLAP-THRUST SPOIL. POSITION		.57	.10	1.64
13	STANDBY COMPASS		.72		.15
14	LANDING GEAR POSITION		.32		1.43
15	FUEL QUANTITY		1.82	3.77	2.38
16	FUEL FLOW		1.40	4.90	2.54
17	OIL PRESSURE - DUAL		.63	2.70	3.74
18	ENGINE TACHOMETER (2)		.98		1.08
19	LANDING GEAR WARNING		.05		
20	HYDRAULIC PRESSURE		.87	3.00	1.19
21	PITOT SYSTEM				9.39
22	CLOCK		.43		
23	ALPHA METER - ANGLE ATTACK		.63		
24	ANGLE OF YAW		.63		
25	VECTOR ANGLE		.26		
26	EXHAUST TEMP - DUAL		1.35		2.38
27	VERTICAL SPEED		1.46		
28					
29	HUD., ATL., HORIZ.STAB. POS.		1.11		3.02
30	LOUVER POSITION		1.11		.16
31					
32					
33					
34					
35					
36					
37					
38					
39	MASTER CAUTION IND.		.13		
40	MASTER CAUTION PNL.		1.41		1.36
41					
42					
43					
44					
45					
46					
47					
48					
49					
50					
51					
52					
53	ATTACHING PARTS				.58
54	SWITCHES, ETC.				.71
55	COLUMN TOTALS		24.16	14.47	32.46
56	TOTAL-INSTRUMENTS				71.09
57					

LIST ITEMS BY FUNCTIONAL GROUPS- FLIGHT, ENGINE & MISC. LIST SUB-GROUPS BY CREW STATION. ADD SUPPLEMENTAL PAGE 26A IF NECESSARY.

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NAME
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* HYDRAULIC AND PNEUMATIC GROUP

PAGE 67
MODEL
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1	X	HYDRAULIC	XX	PNEUMATIC	X
2					
3		UTILITY	EMERG	UTILITY	EMERG
4	PUMPS, COMPRESSORS MODEL				
5	PUMPS - ENGINE DRIVEN (2)	14.32			
6					
7					
8	OIL COOLERS (2)	6.10			
9					
10					
11					
12	REMOTE PUMP DRIVES				
13	QTY CAP. EA				
14	RESERVOIRS 2 272 IN ³	14.30			
15					
16	AIR BOTTLES			***	
17					
18					
19	ACCUMULATORS	7.43			
20	ACCUMULATOR CHARGE FIG.	.80			
21	FILTERS	6.64			
22	PRESSURE REGULATORS				
23	PRESSURE SWITCH	.74			
24	VALVES				
25	CHECK	.16			
26					
27	RELIEF	2.92			
28	CONTROL	.15			
29					
30	CONTROLS				
31	TEMPERATURE INDICATION	.94			
32	LOW PRESS. WARNING	.38			
33	QUICK DISCONNECTS	1.04			
34					
35	PLUMBING	21.46		1.96	
36					
37					
38	FLUID IN SYSTEM	25.62			
39	TYPE MIL-0-5606				
40	CAPACITY 3.66 GAL				
41					
42	SUPPORTS-WING				
43	-TAIL				
44	-BODY	6.52			
45	-NACELLE				
46	FURNISHES POWER FOR **				
47					
48	SEE FOLLOWING PAGE				
49					
50					
51					
52					
53					
54					
55	COLUMN TOTALS	109.52		1.96	
56	PAGE TOTAL				111.48
57	TOTAL-HYDRAULIC AND PNEUMATIC GROUP				111.48

SYSTEM PRESSURE PSI 3000

* INCLUDES SYSTEM FROM SOURCES OF POWER TO MAIN DISTRIBUTION POINTS.

** LIST ITEMS AND INDICATE H-HYDRAULIC, P-PNEUMATIC

*** SEE NEXT PAGE

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XV-5A

PAGE 69

HYDRAULIC SYSTEM FURNISHES POWER FOR:

Wing Fan Doors
Main Landing Gear Doors
" " " Retraction
" " " Uplatch
" " " Brakes
" " " Two Positioning
Nose " " Retraction
Aileron
Horizontal Stabilizer
V.T.O.L. Pitch, Roll and Yaw Control
V.T.O.L. Lift Controls
Diverter Valve
Thrust Spoiler

PNEUMATIC SYSTEM SUPPLIES POWER FOR:

Main Landing Gear Emergency Extension
Nose Landing Gear Emergency Extension
Wing Fan Overspeed Control

*** Upper portion of main landing gear struts contain 210 cu. in. of dry nitrogen at 3000 psig for pneumatic system supply.

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**** ELECTRICAL GROUP
A.C. SYSTEM**

PAGE 71
MODEL
REPORT 63B123

		POWER SUPPLY	POWER CONVER	DISTR & CONT	LIGHTS- SIGNALS	EQUIP SUPPORT
1						
2						
3						
4	POWER SUPPLY* KVA VOLT QTY					
5	GENERATORS					
6						
7						
8						
9						
10	REMOTE GENERATOR DRIVES					
11						
12						
13						
14	POWER CONVERSION QTY					
15	CONVERTER AC-DC					
16	TRANSFORMER		.81			
17	RECTIFIER					
18	MOTOR-GENERATOR					
19	PHASE ADAPTER					
20	FREQUENCY CONVERTER					
21						
22						
23						
24	POWER DISTRIBUTION & CONT					
25	GENERATOR CONTROL BOXES					
26	CUTOUTS, VOLT, REGULATORS					
27	AMMETERS AND VOLTMETERS					
28	SWITCHES, RHEO & PANELS					
29	CIRCUIT BREAKERS & FUSES					
30	JUNCT, FUSE & DIST BOXES					
31	RECEPT & CONNECTOR PLUGS					
32	RELAYS			2.28		
33	WIRING			.84		
34	CONDUIT			.76		
35						
36	LIGHTS AND SIGNAL DEVICES					
37	LIGHTS-INTERIOR					
38	-EXTERIOR -WIRING ONLY				1.11	
39	-LANDING-INCL MECH					
40						
41	SIGNAL DEVICES-LIGHTS					
42	-HORNS					
43	-BELLS					
44						
45	EQUIPMENT SUPPORTS-WING					
46	-TAIL					
47	-BODY					
48	-NACELLE					
49	FURNISHES POWER FOR					
50	SEE FOLLOWING PAGE					
51						
52						
53						
54						
55	COLUMN TOTALS		.81	3.88	1.11	
56	TOTAL- AC SYSTEM					5.80
57						

* DRIVEN BY- 5

** INCLUDES SYSTEM FROM SOURCE OF POWER TO MAIN DISTRIBUTION POINTS.

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A.C. SYSTEM FURNISHES POWER FOR:

Engine Ignition
Amplifier-Stab./Augment
3 Axis Rate Gyro
Indicator-Fuel Quantity
Xmtr-Hyd Press.
Ind-Hyd Press.
Xmtr-Eng Oil Press.
Ind-Eng Oil Press.
Ind-Attitude

Valve-Engine Anti-Ice
Xmtr-Fuel Flow
Indicator-Fuel Flow
Flight Instrumentation

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**** ELECTRICAL GROUP
D.C. SYSTEM**

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MODEL
REPORT 63B123

		POWER SUPPLY	POWER CONVER	DISTR & CONT	LIGHTS- SIGNALS	EQUIP. SUPPORTS
1						
2						
3						
4	POWER SUPPLY* VOLT AMP QTY					
5	GENERATORS 165 2	74.00				
6						
7						
8						
9						
10	REMOTE GENERATOR DRIVES					
11	BATTERY--AN	18.00				
12	BATTERY CONTAINER, SUPTS	.96				
13						
14	POWER CONVERSION QTY					
15	INVERTER DC-AC 250VA (2)		24.06			1.08
16	MOTCR-GENERATOR					
17						
18						
19						
20						
21						
22						
23						
24	POWER DISTRIBUTION & CONT					
25	GENERATOR CONTROL BOXES			13.24		
26	CUTOUTS, VOLT, REGULATORS					
27	AMMETERS AND VOLTMETERS			1.06		
28	SWITCHES, RHEO & PANELS			.27		
29	CIRCUIT BREAKERS & FUSES			9.57		
30	JUNCT, FUSE & DIST BOXES			1.78		1.98
31	RECEPT & CONNECTOR PLUGS			1.84		
32	RELAYS			7.11		
33	WIRING		4.35	23.25		
34	CONDUIT			1.87		
35	BONDING INST'L.			.48		
36	LIGHTS AND SIGNAL DEVICES					
37	LIGHTS-INTERIOR					
38	-EXTERIOR					
39	-LANDING-INCL MECH					
40						
41	SIGNAL DEVICES-LIGHTS					
42	-HORNS					
43	-BELLS					
44						
45	EQUIPMENT SUPPORTS-WING					1.08
46	-TAIL					
47	-BODY					2.27
48	-NACELLE					
49	FURNISHES POWER FOR					
50	SEE FOLLOWING PAGE					
51						
52						
53						
54						
55	COLUMN TOTALS	92.96	28.41	60.47		6.41
56	TOTAL DC SYSTEM					188.25
57	TOTAL ELECTRICAL GROUP - PG 29-30					194.05

* DRIVEN BY- 5

** INCLUDES SYSTEM FROM SOURCE OF POWER TO MAIN DISTRIBUTION POINTS.

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XV-5A

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D.C. SYSTEM FURNISHES POWER FOR:

FLIGHT CONTROLS

Sol Valve-Wing Fan Doors
Sol Valve-Diverter
Sol Valve-Stab/Fan Speed
Sol Valve-Stab/High Speed
Sol Valve-Stab/Trim
Sol Valve-Spoilers
Sol Valve-Low Airspeed Ind.
Actr-Aileron Trim
Actr-Rudder Trim
Actr-VTOL Roll Trim
Actr-VTOL Yaw Trim
Actr-VTOL Pitch Trim
Actr-Thrust Vector
Actr-Wing Fan Door Latch
Actr-Pitch Fan Inlet Louver
Actr-Aileron Droop
Actr-Wing Flaps
Relay-Wing Flaps Control
Controller-Stab/Aug System
Flight Control Electrical Mixer

INSTRUMENT

Fan Speed Ind. and Limiting Control
Sol Valve-Throttle Cutback
Ind-Vector Angle
Ind-Flap/Spoiler
Ind-VTOL Trim
Ind-CTOL Trim
Ind-Landing Gear Position

FLIGHT INSTRUMENT

Ind-Turn and Slip
Test Instrumentation (F.T.)

LANDING GEAR

Sol Valve-Nose Gear
Sol Valve-Main Gear
Sol Valve-Main Gear Door
Sol Valve-Main Gear Mode

POWER

Inverter
Relay-Battery
Relay-Emer Bus
Relay-Nonessential Bus
Relay-Gen. Monitor

FUEL AND OIL

Sol Valve-Fuel Booster Pump
Motor Valve-Fwd. Fuel Tank
Motor Valve-Aft Fuel Tank
Motor Valve-Fuel Cross-Over

RADIO

Transmitting
Receiving

DC CONTROL FOR AC POWER

Relay-Inverter On/Off

WARNING

Fire Detect and Structure O'heat
Fans Frame and Bearing O'heat
Annunciator Panel
Sig.Gen.-Audible Warning
Lamp-Condition (MS25331)
Diverted (Fan Mode)
Fan Doors Locked
Fan Doors Unlocked
Stab.Aug.-Pri.
Stab.Aug.-Stby.
Landing Gear STOL
Pwr. Bus Monitors

AN 9102-D-TAB
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DATE

ELECTRONICS GROUP

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1	*EQUIPMENT COMPONENTS AND	X EQUIPMENT XX			X
2	PART NUMBERS OR IDENT				
3	LIST BY FUNCTIONAL GROUPS	GFAE	CPE	INBYL	
4					
5	UHF TRANSCEIVER ARC/51X				
6	TRANSCEIVER RT-702		30.30	.89	
7					
8	ANTENNA AT 256A		1.54	.33	
9	CABLING		2.93		
10	CONTROL UNIT C3984		3.00		
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					
27					
28					
29					
30					
31					
32					
33					
34					
35					
36					
37					
38					
39					
40					
41					
42					
43					
44					
45					
46					
47	ELECTRONIC INSTALLATION				
48	TABLES				
49	RACKS, SHELVES & SUPPORTS				
50	LOCKERS				
51					
52					
53					
54					
55	COLUMN TOTALS		37.77	1.22	
56	PAGE TOTAL			38.99	
57	TOTAL-ELECTRONIC GROUP			38.99	

* LIST COMPONENTS- INCL RADOMES, MTS, ANT, SWITCHES, RELAYS, FILTERS, ETC
FROM MAIN DISTRIBUTION POINT TO UNIT OPERATED, BY FUNCTIONAL GROUPS-E.G.
COM, VHF, SEARCH, NAV, INTERCOMM, ETC. ADD SUPPLEMENTAL PG 31A IF NEC.

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NAME
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FURNISHINGS AND EQUIPMENT GROUP
ACCOMMODATIONS FOR PERSONNEL

PAGE 81
MODEL
REPORT 63B123

1		X CREW SEATS AND PASSENGER CHAIRS **	XX MISC X
2		ASST	ACCOM
3		PILOT PILOT	& OXYGEN
4	SEATS AND CHAIRS		
5	CUSHION		
6	SEAT	170.80	
7	SAFETY BELT		
8	HARNESS & INERTIA REEL		
9	ADJUSTING MECHANISM		
10	CATAPULT OR EJECT. MECH		
11	TRACKS AND SUPPORTS	17.71	
12	HEADREST		
13			
14			
15			
16			
17	MISC ACCOMMODATIONS		
18	BUNKS AND SUPPORTS		
19			
20	LITTER SUPPORTS		
21	KNEELING PADS		
22	PARACHUTE STOWAGE PROV		
23	TOILET AND RELIEF TUBES		
24	WASH BASINS & SHOWERS		
25	WATER TANKS & PIPING		
26	DRINKING WATER PROV		
27	LOCKERS-FOOD		
28	LOCKERS-PERSONAL EFFECTS		
29			
30			
31			
32			
33	GALLEY STOVES, HOTPLATES		
34	REFRIGERATOR		
35			
36			
37			
38	ANTI-G SUIT PROVISIONS		
39			
40	OXYGEN INSTALLATION- INCLUDED WITH EJECTION SEAT		
41*	BOTTLES TYPE SIZE QTY		
42			
43			
44			
45			
46	CONVERTER		
47*	REGULATORS		
48	SUPTS-BOTTLES, REGULATORS		
49	PLUMBING, ETC		
50			
51			
52			
53			
54			
55	COLUMN TOTALS	188.51	
56	TOTAL-PERSONNEL ACCOMMODATIONS		188.51
57			

* OXYGEN BOTTLE INCLUDING CHARGE, IF NOT SPECIFIED AS USEFUL LOAD OR SPECIAL EQUIPMENT

** ADD ADDITIONAL PAGE 34A IF NECESSARY.

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FURNISHINGS AND EQUIPMENT GROUP
MISC EQUIPMENT AND FURNISHINGS

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1									
2								MISC	
3								EQUIP.	FURN
4	MISCELLANEOUS EQUIPMENT								
5*	PORT, PLATFORMS, LADDERS								
9	BALANCE COMPUTER & SUPT								
6									
7	DATA CASES OR HOLDERS								
8	MANUALS-FLIGHT & MAINT								
10									
11									
12	TOOL LOCKERS								
13									
14	WINDSHIELD WIPER, WASHER								
15	REL MECH-TARGET & TOW								
16									
17	BILGE SYSTEM								
18	STALL WARNING DEVICES								
19	REAR VIEW MIRROR								
20									
21	AUXILIARY FLOORING								
22	INSTRUMENT BOARDS							2.81	
23	CONSOLES							5.31	
24	CONTROL STANDS								
25	INST. PANEL SUPPORTS							1.54	
26*	CARGO HANDLING EQUIPMENT								
27	RAMPS								
28	HOISTS AND BOOMS								
29	MONORAILS								
30	MONORAIL MOTORS								
31	TIE DOWN FITTINGS								
32									
33									
34									
35	PYROTECHNIC INSTALLATION								
36	SIGNAL PISTOL HOLDER								
37	AMMO HOLDER-CAP.-								
38	PARA FLARE								
39	-CONTAINER-CAP.-								
40	-RACKS -CAP.-								
41	-RELEASE MECHANISM								
42	SMOKE CANDLE-HANDLE								
43									
44	FLOATLIGHT RACK & REL								
45	CAP.-								
46	FURNISHINGS								
47	FLOOR COVERING, RUGS ETC								
48	SOUNDPROOFING & INSUL								
49	TRIM								
50	CURTAINS AND SCREENS								
51	CRASH PADDING								
52	PARTITIONS-NON STRUCT								
53									
54									
55	COLUMN TOTALS							9.66	
56	TOTAL-MISCELLANEOUS EQUIPMENT AND FURNISHINGS								9.66
57									

* IF NOT SPECIFIED AS SPECIAL EQUIPMENT

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FURNISHINGS AND EQUIPMENT
EMERGENCY EQUIPMENT

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1	X FIRE PREVENTION & DETECTION SYSTEMS				XX OTHER
2	ENGINE	BAGGAGE	FUEL	OTHER	EMERG
3	COMPT	COMPT	COMPT		EQUIP
4	FIRE PREVENT AND DETECTION				
5	BOTTLES	TYPE	SIZE	QTY	
6	BOTTLE	12.44			
7					
8					
9					
10					
11					
12	PORTABLE				
13					
14					
15					
16	CONTROLS	3.08			
17	PLUMBING	4.93			
18	BOTTLE SUPTS-FIXED EXT	.20			
19					
20					
21	BOTTLE SUPTS-PORT, EXT				
22					
23					
24	FIRE DETECTION SYSTEM	8.24			
25	STRUCTURAL OVERHEAT WARNING			4.22	
26	FIRE RESISTANT PAINT				
27	FIRE CURTAINS				
28					
29	OTHER EMERGENCY EQUIPMENT				
30	FIRST AID KITS & SUPTS				
31	FLASHLIGHTS-QTY				
32					
33	STOWAGE-EMERG FOOD, WATER				
34					
35*	LIFE RAFTS	TYPE	QTY		
36					
37					
38					
39	LIFE RAFT SUPPORTS				
40					
41	DITCHING STATION EQUIP				
42					
43					
44					
45					
46					
47					
48					
49					
50					
51					
52					
53					
54					
55	COLUMN TOTALS	28.89		4.22	
56	TOTAL-EMERGENCY EQUIPMENT				
57	TOTAL-FURNISHINGS & EQUIPMENT GROUP - PG 34-36				
					33.11
					231.28

* IF NOT SPECIFIED AS USEFUL LOAD OR SPECIAL EQUIPMENT.

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AIR CONDITIONING AND ANTI-ICING
EQUIPMENT GROUP
AIR CONDITIONING

PAGE 87
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1							
2				PRESS.	VENTIL	HEATING	COOLING
3				SYSTEM	SYSTEM	SYSTEM	SYSTEM
4	*HEAT EXCHANGERS-QTY						
5							
6	*HEATERS-BTU EA QTY						
7							
8							
9							
10							
11	HEATING FLUID- GAL						
12							
13	COMPRESSORS OR SUPCHGRS						
14							
15	MOTORS						
16	TURBINES						
17	FANS						11.59
18							
19							
20	TANKS						
21	WATER SEPARATOR						
22	REGULATOR						
23							
24							
25	SCOOPS						
26	DUCTING						13.06
27	SHROUDS						
28							
29	PLENUM CHAMBER						4.99
30	PLUMBING						
31							
32							
33	BOMB BAY HEATING						
34							
35							
36							
37							
38							
39	CONTROLS						
40	-MANUAL						
41							
42	-ELECTRICAL						
43							
44	-HYDRAULIC						
45							
46	-PNEUMATIC						
47							
48	SUPPORTS & BRACKETS-WING						
49	-TAIL						
50	-BODY						.18
51	-NACELLE						
52							
53							
54	PRESSURIZATION SEALING						
55	COLUMN TOTALS						29.82
56	TOTAL-AIR CONDITIONING						29.82
57							

* IF NOT SPECIFIED AS SPECIAL EQUIPMENT.

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DATE

AIR CONDITIONING AND ANTI-ICING
EQUIPMENT GROUP
ANTI-ICING

PAGE 89
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1								
2								
3		WING	TAIL	AIR INDUCT.	ENGINE	CANOPY & WINDSHLD	FUEL SYSTEM	
4	*HEATERS	BTU	EA	QTY				
5								
6								
7								
8								
9								
10								
11	*HEAT EXCHANGERS							
12								
13								
14								
15	DUCTING							
16	SHROUDING							
17								
18								
19	*BOOTS							
20								
21	*ATTACHING STRIPS							
22								
23	OIL SEPARATORS							
24								
25	AIR PUMPS							
26								
27	AIR LINES AND HOSES							
28								
29	TANKS							
30								
31	*FLUID-		GAL					
32								
33								
34								
35	PLUMBING							
36								
37								
38	DISTRIBUTOR							
39	-VALVE							
40	-CONTROLS							
41								
42	CONTROLS							
43	-MANUAL							
44	-ELECTRICAL							
45	-HYDRAULIC							
46	-PNEUMATIC							
47								
48	**CIRCUITRY				1.12			
49	SUPPORTS AND BRACKETS-WING							
50	-TAIL							
51	-BODY							
52	-NACELLE							
53								
54								
55	COLUMN TOTALS				1.12			
56	TOTAL-ANTI-ICING							1.12
57	TOTAL-AIR CONDITIONING AND ANTI-ICING GROUP - PG 37-38							30.94

* IF NOT SPECIFIED AS SPECIAL EQUIPMENT
** FROM MAIN DISTRIBUTION POINT TO ACTUATING UNIT.

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AUXILIARY GEAR GROUP

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1					
2					
3			HANDLING	ARREST	CATAPULT
4	HANDLING GEAR				ATO
5	ANCHOR				
6	ANCHOR LINE				
7	PENDANT & CLAMP FITTING				
8	LIZARD				
9	SHEAVES				
10	WINCH-COMplete				
11	WINCH CRANK				
12	ANCHOR RIG OR DAVIT				
13	WINCH ENGINE OR MOTOR				
14					
15*	HOISTING SLING				
16	WING HANDLING LINES				
17	WATER RUDDER				
18	FITTINGS				
19	-RECOVERY HOOK				
20	-BEACH GEAR ATTACHMENT				
21	-TIEDOWN				
22	-JACKING		.49		
23	-TOWING				
24	-MOORING & SNUBBING				
25	-ANCHORAGE				
26	-LEVELING				
27	-HOISTING				
28					
29	ARRESTING OR DECELER GEAR				
30	TRAILING HOOK				
31	HOOK POINT-TYPE				
32	EXTENSION GEAR				
33	RETRIEVING GEAR				
34	BUMPER				
35	SHOCK ABSORBER				
36	ATTACHMENT FITTINGS				
37	BARRIER CRASH FITTINGS				
38					
39	DECELERATION-PARACHUTE			13.60	
40	-CONTAINER & FITTINGS			5.37	
41	-CONTROLS			7.74	
42					
43	CATAPULTING GEAR				
44	CATAPULT FITTINGS				
45	CATAPULT HOOKS				
46	HOLD BACK FITTINGS				
47					
48	ASSISTED TAKE OFF				
49	HOOKS				
50	CONTROLS-FIRING				
51	-BOTTLE RELEASE				
52					
53	BOTTLE STOWAGE PROV				
54	QTY BOTTLES-				
55	COLUMN TOTALS		.49	26.71	
56	PAGE TOTAL				27.20
57	TOTAL-AUXILIARY GEAR GROUP				27.20

* IF NOT SPECIFIED AS SPECIAL EQUIPMENT.

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WEIGHT AND BALANCE REPORT
XV-5A

PAGE 93

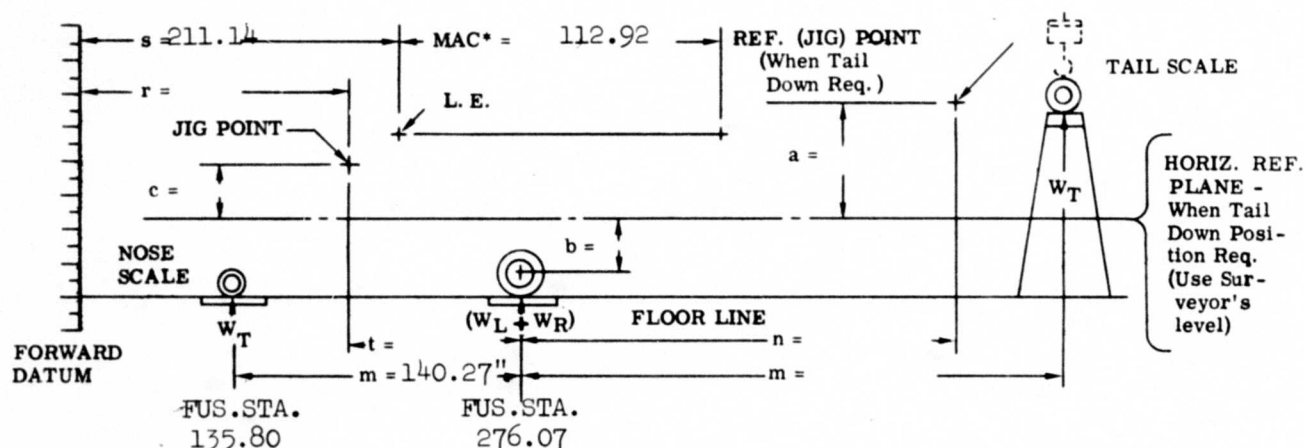
2.4 Actual Weight and Center of Gravity

Load Condition EMPTYPrepared by B. Giske

Date _____

Page 95Model XV-5AReport No. 63B123**AIRCRAFT ACTUAL WEIGHT AND HORIZONTAL BALANCE**Contract No. DA44-177-TC-715, Gov't. No. 62-4506, Fact. No. 2, Art. No. 2

SCALE POSITION	SCALE NO.	SCALE READING (Lbs.)	TARE	SCALE ERROR	SYMBOL	NET WEIGHT
Left Main Wheel	E215993	3055.0	-6.7	0.0	W_L	3048.3
Right Main Wheel	E239583	3058.0	-6.7	-3.0	W_R	3048.3
Nose Wheel	E239584	1998.0	0	+6.0	W_T	2004.0
TOTAL WEIGHT		8111.0	-13.4	+3.0	W	8100.6

**CENTER OF GRAVITY TO FORWARD DATUM (HORIZ. DIST. - AS WEIGHED)**

Tail Wheel Type:

$$r + t + \frac{W_T \times m}{W} = \text{In.}$$

Nose Wheel Type:

$$r + t - \frac{W_T \times m}{W} = 276.07 - \frac{(2004.0)(140.27)}{8100.6} = 241.37 \text{ In.}$$

CORRECTED WEIGHT & HORIZONTAL BALANCE

ITEMS ADDED & SUBTRACTED	WEIGHT (Lbs.)	H-DIST (In.) C.G. TO FWD. DATUM	MOMENT (In. - Lbs.)	GUARANTEED
Aircraft as Weighed	8100.6	241.37	1,955,241	
Plus - See Pages	+ 39.7		+ 19,934	
Minus - See Pages	- 599.3		- 101,987	
TOTAL EMPTY WEIGHT (Gear Up)	7541.0	248.40	1,873,188	
BALANCE = $\frac{(H-Dist.) - S}{M.A.C.}$	$\frac{248.40 - 211.14}{112.92} = 33.0$ % M.A.C.			
(Corrected)	to % M.A.C.			

*M.A.C. calc. in accord. with Handb'k Sec. II, Part II, (Army) or SR-7 (Navy)

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WEIGHT EMPTY ITEMS NOT ON AIRPLANE DURING WEIGHING:

	<u>WEIGHT</u>	<u>ARM</u>	<u>MOMENT</u>
Initiators & Cartridges - Seat	.80	125.0	100
Rocket Catapult - Seat	21.75	147.0	3,197
Fluid - Battery	3.27	471.7	1,542
Finish - Mag. Skin, Aft Fus.	3.73	395.0	1,473
Finish - Mag. Skin, Horiz. Stab.	2.96	493.7	1,461
Finish - Mag. Skin, Vert. Stab.	2.00	476.5	953
F074 Attach Parts	.50	248.5	124
F076 Attach Parts	.13	184.6	24
P006 Attach Parts	.90	126.0	113
Retract Nose & Main Gear	.00		9,906
Fasteners for Misc. Access Panels	1.15	233.0	268
W056 Fairing - Flap Hinge Fitting	1.78	301.1	536
Bolts - Horiz. Stab. Tips	.19	513.3	98
F176 Tension Rod	.54	257.4	139
TOTAL ADDITIONS	39.70		19,934

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ITEMS ON AIRPLANE THAT ARE NOT PART OF WEIGHT EMPTY:

	<u>WEIGHT</u>	<u>ARM</u>	<u>MOMENT</u>
Flight Test Equipment	314.33	171.7	53,962
P085 Aft Auxiliary Fuel Tank	35.17	339.0	11,922
Simulated Pilot	182.00	137.0	24,934
G.E. Slip Ring - Pitch Fan	5.60	61.2	343
G.E. Slip Ring - Lift Fan	15.48	256.0	3,963
Oil - Trapped	3.00	204.0	612
Oil - Engine	12.00	204.0	2,448
Fan Overspeed Control	8.32	121.9	1,014
F148-1 Nose Boom	5.60	- 1.9	- 11
Auto-Stab System Instrumentation	1.70	109.0	185
E027 Fan Warning	2.91	160.5	467
E019 Wiring	6.11	168.1	1,027
R.P.M. Indicator (AC-106)	6.80	156.0	1,061
W006 -69 and -73 Tube Portion	.28	214.3	60
TOTAL DEDUCTIONS	- 599.30		-101,987

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XV-5A

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2.5 Weight Empty - Weight and Balance Summary

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<u>WEIGHT EMPTY - WEIGHT AND BALANCE SUMMARY</u>					
	WEIGHT	HORIZONTAL		VERTICAL	
		ARM	MOMENT	ARM	MOMENT
WING	1047.46	263.5	275979	104	108480
TAIL	237.79	495.7	117866	183	43446
BODY	1264.88	246.6	311364	109	138215
LANDING GEAR (Gear Up)	(420.14)	281.5	(118260)	92	(38445)
Main Gear	354.33	312.5	110739	93	33094
Nose Gear	65.81	114.3	7521	81	5351
SURFACE CONTROLS	30.40	230.4	87631	105	39928
ENGINE SECTION	4.39	249.9	11092	139	6148
PROPULSION	(3435.85)	235.4	(808761)	116	(399390)
Gas Generator Section	1221.85	241.3	294768	143	174427
Lift Fan Section	1746.54	255.8	446720	102	177813
Pitch Fan Section	311.14	97.8	30419	94	29153
Fuel System	112.13	241.0	27018	117	13128
Engine Controls	38.11	221.3	8435	109	4156
Starting System	6.08	230.4	1401	117	713
FIXED EQUIPMENT	(705.03)	199.8	(140826)	116	(81815)
Instruments	71.09	163.8	11645	120	8535
Hydraulics & Pneumatics	111.48	183.7	20482	122	13652
Electrical	194.05	253.9	49274	118	22816
Radio	38.99	153.3	5979	95	3706
Furnishings & Equipment	231.28	152.5	35260	112	25968
Air Conditioning & Anti-Icing	30.94	193.2	5977	137	4242
Auxiliary Gear	27.20	448.9	12209	106	2890
UNACCOUNTABLE WEIGHT	+ 5.06	178.4	+ 909		
TOTAL WEIGHT EMPTY (Gear Up)	7541.00	248.4	1873188	113	855867

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2.6 Weight Empty - Weight and Balance Details

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WEIGHT EMPTY - WEIGHT AND BALANCE DETAILS					
	WEIGHT	HORIZONTAL		VERTICAL	
		ARM	MOMENT	ARM	MOMENT
WING GROUP	(1047.46)	263.5	(275979)	104	(108480)
Basic Structure	(567.12)	255.7	(145009)	102	(57615)
Center Section	(423.12)	250.2	(105879)	101	(42744)
Upper Skin and Supports	(31.28)	254.9	(7973)	105	(3298)
Interspar Skin	17.29	251.9	4356	107	1850
Skin Joints, Splices, etc.	8.81	259.6	2287	102	903
Brackets - Skin Support	5.18	256.7	1330	105	545
Lower Skin and Supports	(36.41)	256.6	(9343)	96	(3492)
Interspar Skin	25.07	257.5	6456	95	2393
Skin Joints, Splices, etc.	4.44	252.9	1123	96	428
Brackets - Skin Support	6.90	255.7	1764	97	671
Front Spar	94.34	217.0	20473	101	9528
Rear Spar	88.50	296.5	26240	101	8939
Ribs - Interspar	4.42	263.3	1164	100	442
Bulkhead @ B.L. 100.75	23.09	261.6	6041	102	2351
Joints, Splices and Fasteners	5.83	260.0	1516	99	577
Fan Ring	25.95	258.1	6697	101	2624
Leading Edge	(63.37)	208.6	(13220)	101	(6407)
Skin	36.00	207.2	7460	101	3643
Ribs	22.09	209.4	4626	101	2231
Joints, Splices & Fasteners	5.28	214.8	1134	101	533
Trailing Edge	(23.60)	303.9	(7172)	103	(2435)
Skin	16.95	304.6	5163	103	1754
Ribs	3.75	300.2	1126	102	383
Auxiliary Spar	1.58	306.0	483	103	163
Joints, Splices & Fasteners	1.32	303.4	400	103	135
Attach Fittings - Wing to Body	26.33	229.4	6040	101	2650
Outer Panel	(144.00)	271.7	(39130)	103	(14870)
Skin	56.04	272.0	15243	104	5811
Front Spar	14.79	252.5	3734	103	1524
Rear Spar	13.55	296.5	4018	103	1401
Doublers - Skin	3.90	288.6	1126	99	386
Ribs	29.82	271.5	8096	103	3067
Joints, Splices & Fasteners	1.77	293.2	519	102	181

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WEIGHT AND BALANCE REPORT XV-5A

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WEIGHT EMPTY - WEIGHT AND BALANCE DETAILS (Cont'd.)

WING GROUP (Cont'd.)

Basic Structure (Cont'd.)

Outer Panel (Cont'd.)

	WEIGHT	HORIZONTAL		VERTICAL	
		ARM	MOMENT	ARM	MOMENT
Leading Edge	(14.48)	245.5	(3555)	103	(1497)
Skin	10.80	245.7	2653	103	1117
Ribs	2.48	248.1	615	104	257
Joints, Splices & Fasteners	1.20	238.9	287	103	123

Trailing Edge	(5.61)	299.6	(1681)	103	(579)
Skin	3.48	299.6	1043	103	357
Stiffeners	.71	301.5	214	106	75
Ribs	1.27	298.7	379	104	132
Joints, Splices & Fasteners	.15	298.9	45	99	15

Tips	4.04	286.7	1158	105	424
------	------	-------	------	-----	-----

Secondary Structure	(343.53)	258.2	(88699)	108	(37015)
---------------------	-----------	-------	----------	-----	----------

Doors, Panels & Miscellaneous	(343.53)	258.2	(88699)	108	(37015)
-------------------------------	-----------	-------	----------	-----	----------

Access Doors	15.78	273.6	4317	100	1575
Fan Doors	(259.47)	256.3	(66515)	110	(28541)
Fan Door Structure	126.46	256.0	32375	110	13921
Hinges and Supports	27.16	255.9	6951	112	3053
Power Transmission	17.47	272.5	4760	105	1838
Actuator	27.36	256.0	7004	109	2982
Actuator - Support	41.05	256.0	10508	112	4594
Lock Mechanism	19.97	246.2	4917	108	2153
Fan Seal	12.70	254.2	3228	103	1308
Seal- Trailing Edge-Flap	1.64	311.1	510	103	169
Insulation - External	28.99	268.7	7790	97	2821
Fairings and Fillets	24.95	254.1	6339	104	2601

Control Surfaces	(136.81)	309.0	(42271)	101	(13850)
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Ailerons	(60.27)	306.2	(18457)	103	(6217)
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Spars	5.60	305.5	1711	103	576
Ribs	8.81	307.4	2708	103	910
Skin and Stiffeners	9.77	307.1	3001	104	1015
Trailing Edge Strip	.42	320.4	135	105	44
Tips	1.80	306.5	552	106	191
Tab Structure	(11.69)	318.6	(3725)	102	(1188)
Tab Structure	8.11	319.4	2590	102	826
Balance Weights	3.58	317.0	1135	101	362

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WEIGHT EMPTY - WEIGHT AND BALANCE DETAILS (Cont'd.)

	WEIGHT	HORIZONTAL		VERTICAL	
		ARM	MOMENT	ARM	MOMENT
WING GROUP (Cont'd.)					
Control Surfaces (Cont'd.)					
Ailerons (Cont'd.)					
Aerodynamic Seals	1.66	298.0	495	104	173
Access Doors	.69	310.0	214	105	72
Hinges and Pins	1.38	306.8	423	103	142
Control Surface Supports	(18.45)	297.8	(5495)	103	(1906)
Hinges	14.12	299.2	4224	103	1461
Brackets	4.33	293.4	1271	103	445
Flaps	(76.54)	311.1	(23814)	100	(7633)
Spars	8.95	310.0	2774	100	895
Stringers	1.48	317.1	469	100	149
Ribs	14.00	311.2	4356	100	1403
Skin and Stiffeners	34.35	312.9	10747	100	3435
Trailing Edge Strip	1.80	324.0	583	100	180
Actuator Attach Structure	2.48	308.7	765	100	248
Hinges and Pins	7.23	307.8	2226	100	720
Control Surface Supports	(6.25)	303.0	(1894)	96	(603)
Hinges	4.85	301.5	1462	97	471
Brackets	1.40	308.7	432	94	132
TAIL GROUP	(237.79)	495.7	(117866)	183	(43446)
Horizontal Stabilizer	(73.52)	500.0	(36757)	205	(15102)
Skin	20.24	504.4	10208	206	4170
Front Spar	2.73	483.1	1319	206	562
Center Spar	8.43	496.0	4181	206	1737
Rear Spar	3.44	513.7	1767	203	697
Ribs	13.30	501.9	6676	206	2738
Joints, Splices & Fasteners	2.15	497.1	1069	206	443
Leading Edge	(8.72)	485.5	(4234)	206	(1796)
Skin	6.24	485.0	3027	206	1285
Ribs	2.48	486.5	1207	206	511
Trailing Edge	(.71)	521.1	(370)	206	(146)
Stiffeners	.05	533.1	27	206	10
Ribs	.66	519.2	343	206	136
Fibreglass Fairing	3.99	501.2	2000	200	796
Tips	4.26	510.6	2175	206	878
Actuator Fitting	.29	483.8	140	205	59
Pivot Fitting	1.39	496.1	690	204	283
Aerodynamic Seal Attachment	.91	513.7	467	206	187
Exterior Finish	2.96	493.7	1461	206	610

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WEIGHT EMPTY - WEIGHT AND BALANCE DETAILS (Cont'd.)

	WEIGHT	HORIZONTAL		VERTICAL	
		ARM	MOMENT	ARM	MOMENT
TAIL GROUP (Cont'd.)					
Vertical Stabilizer	(85.37)	481.2	(41081)	168	(14301)
Skin	25.76	484.6	12484	165	4250
Front Spar	4.07	456.4	1858	158	643
Center Spar	10.23	478.6	4896	163	1669
Rear Spar	3.01	498.6	1501	151	455
Ribs	20.71	483.1	10006	167	3455
Leading Edge	(7.66)	453.7	(3475)	164	(1260)
Skin	4.67	452.6	2114	165	771
Ribs	2.99	455.2	1361	163	489
Trailing Edge	(.96)	505.2	(485)	160	(154)
Stiffeners	.68	502.1	341	154	104
Ribs	.28	513.9	144	180	50
Fibreglass Fairing	4.96	498.0	2470	193	957
Actuator Fitting	.42	474.9	199	186	78
Pivot Fitting	2.59	495.8	1284	200	518
Access Doors	2.60	488.6	1270	185	480
Aerodynamic Seal Attachment	.41	500.0	205	155	64
Exterior Finish	1.99	476.5	948	160	318
Dorsal Fin	(3.15)	421.7	(1328)	145	(458)
Skin	1.54	420.0	647	145	223
Joints, Splices & Fasteners	.63	419.3	264	148	93
Frames	.88	426.6	375	145	128
Exterior Finish	.10	420.0	42	145	14
Elevator	(43.32)	517.6	(22424)	206	(8925)
Spars	2.14	518.2	1109	206	441
Ribs	2.44	521.8	1273	206	503
Skin	8.70	522.4	4545	206	1792
Trailing Edge Strip	.60	530.5	318	206	124
Torque Tube	3.15	517.8	1631	206	649
Balance Weights & Supports	21.28	515.0	10959	206	4384
Aerodynamic Seal	1.23	515.0	633	206	253
Access Doors	.38	517.7	197	207	79
Hinges and Pins	1.50	517.8	777	206	309
Control Surface Support Hinges	1.90	517.0	982	206	391

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WEIGHT EMPTY - WEIGHT AND BALANCE DETAILS (Cont'd.)

	WEIGHT	HORIZONTAL		VERTICAL	
		ARM	MOMENT	ARM	MOMENT
TAIL GROUP (Cont'd.)					
Rudder	(32.43)	501.9	(16276)	144	(4660)
Spars	4.55	504.3	2295	149	678
Ribs	1.83	507.0	928	146	267
Rib Attach Angles	.11	507.0	56	138	15
Skin	4.02	507.7	2041	151	607
Trailing Edge Strip	.24	520.8	125	161	39
Tab	1.88	512.3	963	131	247
Torque Tube	3.48	496.2	1727	122	424
Balance Weights and Supports	12.21	498.0	6081	148	1803
Aerodynamic Seal	.84	500.1	420	154	129
Access Doors	.53	505.4	268	130	69
Hinges and Pins	.96	512.0	492	168	162
Control Surface Supports	(1.78)	494.4	(880)	124	(220)
Hinges	.69	495.3	342	120	83
Brackets	.77	492.3	379	122	94
Actuator	.32	496.6	159	134	43
BODY GROUP	(1264.88)	246.6	(311864)	109	(138215)
Basic Structure	(794.54)	257.1	(204314)	110	(87534)
Bulkhead and Frames	(324.31)	254.6	(82574)	110	(35801)
Front Hinge Frame	3.92	35.2	138	93	364
Rear Hinge Frame	12.30	80.4	988	83	1022
Frame - Sta. 91	12.48	90.2	1126	97	1215
Bulkhead - Sta. 214	47.13	214.1	10090	106	4993
Canted Bulkhead - Sta. 146	27.74	148.5	4118	108	3000
Bulkhead - Sta. 165.2	14.46	165.0	2386	106	1530
Frame, Engine Support - Sta. 214	13.63	210.4	2867	150	2049
Bulkhead, M.L.G. Drag Strut	20.25	317.0	6419	112	2277
Bulkhead - M.L.G. - Sta. 287	20.06	287.0	5757	125	2502
Bulkhead - Rear Spar - Sta. 296	39.49	296.5	11709	104	4114
Bulkhead - Stab. Front Spar	5.12	432.8	2216	119	608
Bulkhead - Stab. Center Spar	6.30	456.6	2876	116	732
Bulkhead - Stab. Rear Spar	3.44	488.4	1680	120	413
Minor Frames	97.99	308.3	30206	112	10982

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WEIGHT EMPTY - WEIGHT AND BALANCE DETAILS (Cont'd.)

BODY GROUP (Cont'd.)

Basic Structure (Cont'd.)

	WEIGHT	HORIZONTAL		VERTICAL	
		ARM	MOMENT	ARM	MOMENT
Truss Structure	108.80	253.0	27524	114	12400
Joints, Splices & Fasteners	19.51	293.4	5724	110	2151
Vertical Stiffeners	2.59	131.3	340	106	275
Skin - Upper Between Longerons	25.33	348.7	8831	143	3615
Skin - Side Between Longerons	50.31	299.3	15057	112	5637
Skin - Lower Between Longerons	21.30	336.2	7161	93	1990
Horizontal Stiffeners	4.51	215.8	973	111	500
Stringers - Side	8.76	199.6	1749	109	958
Wing L.E. Attach Fittings	.78	189.0	147	100	78
Drag Angle - Fuselage to Fin	4.99	440.0	2196	135	674
Longerons - Upper	36.55	264.0	9648	127	4626
Longerons - Lower	40.43	277.4	11217	98	3967
Longerons - Upper External	8.04	349.1	2807	152	1221
Horizontal Shear Webs	65.02	239.1	15547	107	6971
Flooring and Supports	21.21	158.6	3363	94	1984
Nose Wheel Well	12.89	117.4	1513	82	1054
Main Gear - Door Support Structure	21.18	309.4	6554	89	1887
Pitch Fan Mount Structure	15.63	67.8	1059	98	1527
Pitch Fan Cutout Keelson	1.32	57.9	76	77	102
Miscellaneous	1.08	235.2	254	108	116

Secondary Structure

Enclosure	(66.90)	133.2	(8908)	132	(8798)
Canopy	61.87	131.5	8136	131	8116
Canopy Hinge Structure	4.25	160.4	682	141	598
Canopy Latch Structure	.78	115.7	90	108	84

Windshield	53.94	104.5	5636	122	6607
Heat Shielding - Internal	2.21	271.5	600	138	305
Jack Pad Provisions	1.07	394.0	422	97	104
Nose Cone	14.85	17.9	265	94	1394
Tail Cone	8.06	499.4	4025	111	899
Tail Bumper	1.47	501.0	736	102	150

Doors, Panels & Miscellaneous	(321.84)	270.2	(86958)	101	(32424)
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Nose Ldg. Gear Door	(10.22)	112.3	(1148)	76	(778)
Door Structure	6.22	115.4	717	73	454
Door Mechanism	4.00	107.9	431	81	324

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WEIGHT EMPTY - WEIGHT AND BALANCE DETAILS
(Cont'd.)

BODY GROUP (Cont'd.)

Doors, Panels & Miscellaneous (Cont'd.)

	WEIGHT	HORIZONTAL		VERTICAL	
		ARM	MOMENT	ARM	MOMENT
Main Ldg. Gear Door	(91.75)	312.0	(28626)	84	(7734)
Door Structure	50.23	313.5	15745	82	4099
Mechanism and Controls	4.85	317.6	1540	85	410
Power Transmission	3.71	326.2	1210	90	335
Actuator	32.96	307.4	10131	88	2890
Access Doors - Miscellaneous	6.26	238.1	1490	95	593
Access Door - Spin Chute	2.31	470.2	1086	113	262
Access Door - Sta. 100 to 133	7.36	116.2	855	79	582
Access Door - Elect. Compt.	5.34	155.0	828	100	534
Panels	(152.70)	238.6	(36429)	114	(17339)
Access - Top - Sta. 214-287	47.52	248.8	11824	152	7207
Access - Side - Sta. 214-287	36.30	249.3	9051	121	4385
Access - Lower - Sta. 165-276	60.14	226.3	13610	81	4893
Seal - Fuselage to Canoe	2.65	285.0	755	94	250
Closure - Pitch Fan	2.81	63.8	179	96	270
M.L.G. Well Protective	3.28	308.0	1010	102	334
Fairing - Tail Pipe Exit	16.04	413.5	6632	95	1529
Exterior Finish	5.59	311.3	1740	110	617
Insulation - External	24.27	334.8	8124	101	2456

ALIGHTING GEAR GROUP
(Retracted Positon)

Main Gear	(354.33)	312.5	(110739)	93	(33094)
Running Gear	(73.70)	352.7	(25994)	92	(6780)
Wheels, 20 X 4.4	28.90	352.7	10193	92	2659
Tires, 20 X 4.4, 12 Ply, Type VII	23.70	352.7	8359	92	2180
Brakes	21.10	352.7	7442	92	1941
Structure	(221.07)	316.6	(69983)	93	(20593)
Drag Strut	34.83	308.6	10749	89	3085
Side Strut	10.10	312.6	3157	87	879
Vee Brace	15.09	287.7	4342	86	1304
Shock Strut	79.14	327.9	25946	92	7285

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WEIGHT AND BALANCE DETAILS (Cont'd.)

	WEIGHT	HORIZONTAL		VERTICAL	
		ARM	MOMENT	ARM	MOMENT
ALIGHTING GEAR GROUP (Cont'd.) (Retracted Position)					
Main Gear (Cont'd.)					
Structure (Cont'd.)					
Oil - Shock Struts	3.40	332.1	1129	92	313
Torque Arms	5.66	343.3	1943	88	498
Two Position Linkage	25.86	312.4	8078	98	2547
Main Attach Fittings - Body	45.22	311.6	14091	100	4515
Ground Feeler Probe	.62	352.7	219	92	57
Pins, Bolts, Nuts, Etc.	1.15	286.0	329	96	110
Controls	(59.56)	247.8	(14762)	96	(5721)
Retracting	(30.36)	276.8	(8405)	96	(2907)
Electrical Circuitry	3.37	239.7	808	100	338
Electrical Controls	1.04	110.1	115	114	119
Hydraulic Operating Mech.	(13.11)	304.0	(3986)	92	(1207)
Plumbing	3.97	305.3	1212	95	377
Selector Valves	1.36	292.0	397	94	128
Sequence Valves	.68	305.0	207	93	63
Actuator	7.06	305.7	2158	90	635
Fluid	.04	296.0	12	98	4
Uplatch Operating Mech.	(8.79)	328.7	(2889)	94	(829)
Actuator	.97	329.0	319	91	88
Mechanism	7.82	328.6	2570	95	741
Position Indicating Mech.	3.88	143.2	556	103	398
Supports - Body	.17	298.2	51	96	16
Brake Operating	(12.65)	145.8	(1845)	105	(1333)
Mechanical Controls	4.92	97.1	478	110	540
Hydraulic Plumbing	6.19	193.6	1199	101	624
Supports - Body	1.30	95.1	124	113	147
Hydraulic Fluid	.24	185.0	44	90	22
Emergency Extension	(5.98)	220.1	(1316)	93	(557)
Electrical Circuitry	.24	127.7	31	94	23
Pneumatic Operating Mech.	(5.34)	231.1	(1234)	93	(498)
Controls	1.65	128.1	211	95	157
Plumbing	3.69	277.2	1023	92	341

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<u>WEIGHT EMPTY - WEIGHT AND BALANCE DETAILS</u> (Cont'd.)					
	WEIGHT	HORIZONTAL		VERTICAL	
		ARM	MOMENT	ARM	MOMENT
ALIGNING GEAR GROUP (Cont'd.) (Retracted Position)					
Main Gear (Cont'd.)					
Controls (Cont'd.)					
Emergency Extension (Cont'd.)					
Supports - Body	.40	127.4	51	91	36
Two Positioning Controls	(10.57)	302.4	(3196)	87	(924)
Electrical Circuitry	1.13	222.7	252	98	111
Plumbing	.47	319.0	150	87	41
Selector Valve	1.34	322.0	431	91	122
Actuator	7.40	309.4	2290	85	629
Supports - Body	.15	323.0	48	93	14
Hydraulic Fluid	.08	316.0	25	84	7
Nose Gear	(65.81)	114.3	(7521)	81	(5351)
Running Gear	(20.17)	99.2	(2001)	83	(1674)
Wheels	9.22	99.2	915	83	765
Tires, 18 X 4.4	10.95	99.2	1086	83	909
Structure	(38.83)	120.6	(4682)	79	(3086)
Shock Strut, Oil & Damper	27.75	120.3	3338	78	2165
Drag Strut	7.14	120.9	863	86	612
Main Attach Fittings - Body	3.94	122.1	481	78	309
Controls	(6.81)	123.0	(838)	87	(591)
Retracting	(6.27)	123.6	(775)	87	(543)
Electrical Circuitry	.77	130.6	101	87	67
Hydraulic Operating Mech.	(5.09)	122.6	(624)	86	(437)
Plumbing	2.81	121.4	341	84	237
Fluid	.10	125.0	12	85	8
Actuator	2.18	124.1	271	88	192
Position Indicating Mech.	.32	122.8	39	97	31
Supports - Body	.09	121.7	11	86	8
Emergency Extension	(.54)	116.7	(63)	89	(48)

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<u>WEIGHT EMPTY - WEIGHT AND BALANCE DETAILS</u> (Cont'd.)					
	WEIGHT	HORIZONTAL		VERTICAL	
		ARM	MOMENT	ARM	MOMENT
ALIGHTING GEAR GROUP (Cont'd.) (Retracted Position)					
Nose Gear (Cont'd.)					
Controls (Cont'd.)					
Emergency Extension (Cont'd.)					
Electrical Circuitry	.26	116.4	30	94	24
Pneumatic Plumbing	.28	117.0	33	86	24
SURFACE CONTROLS	(380.40)	230.4	(87631)	105	(39928)
Cockpit Controls	(22.49)	116.7	(2625)	102	(2285)
Control Column	3.67	117.7	432	109	399
Control Column Conn. Members	5.62	122.7	690	89	499
Rudder Pedals	6.26	101.9	638	108	678
Rudder Pedal Supports	.12	102.0	12	114	14
Rudder Pedal Adjust Mech.	1.40	101.3	142	108	151
Lift Stick	5.04	130.3	656	101	509
Lift Stick Mechanism	.38	144.0	55	92	35
Auto-Stabilization	(39.24)	155.6	(6107)	101	(3952)
Auto Stabilization Controller	29.19	150.0	4379	101	2951
Electrical Circuitry	10.05	171.9	1728	100	1001
System Controls - Conventional	(131.86)	318.0	(41931)	117	(15444)
Aileron	(37.87)	247.0	(9353)	100	(3768)
Mechanical Controls	16.93	231.0	3910	99	1680
Electrical Circuitry	.40	252.6	101	102	41
Trim Controls	1.58	307.8	486	104	164
Hydraulic Operating Mech.	(9.98)	298.2	(2976)	100	(993)
Plumbing	3.29	300.0	987	99	324
Fluid	.39	300.0	117	99	39
Actuators	6.30	297.2	1872	100	630
Aileron Droop System	(4.93)	192.1	(947)	100	(494)
Mechanical Controls	3.37	193.5	652	100	336
Electric Actuator	1.24	198.0	246	101	125
Electric Circuitry	.32	154.1	49	104	33
Supports - Wing	2.73	255.7	698	100	272
Supports - Body	1.32	178.0	235	94	124

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WEIGHT EMPTY - WEIGHT AND BALANCE DETAILS (Cont'd.)

	WEIGHT	HORIZONTAL		VERTICAL	
		ARM	MOMENT	ARM	MOMENT
SURFACE CONTROLS (Cont'd.)					
System Controls - Conventional (Cont'd.)					
Elevator	(20.90)	294.5	(6154)	119	(2488)
Mechanical Controls	12.86	352.6	4534	135	1737
Tension Regulator	4.20	159.2	669	86	361
Supports - Body	3.84	247.8	951	102	390
Rudder	(19.54)	302.4	(5908)	106	(2068)
Mechanical Controls	10.16	204.9	2082	98	991
Tension Regulator	4.12	494.9	2039	117	482
Electrical Circuitry	.75	264.5	198	120	90
Trim Controls	1.57	470.4	739	127	200
Supports - Body	2.94	289.3	850	104	305
Flaps	(18.91)	315.3	(5962)	100	(1895)
Electrical Circuitry	2.52	271.3	684	102	258
Electric Actuator	15.22	321.5	4893	100	1522
Supports - Body	1.17	329.3	385	99	115
Horizontal Stabilizer	(34.64)	420.1	(14554)	151	(5225)
Electrical Circuitry	5.18	304.5	1577	119	617
Trim Controls - Electrical	.05	141.5	7	101	5
Hydraulic Actuating Mech.	(29.41)	441.0	(12970)	157	(4603)
Plumbing	14.77	410.8	6068	125	1847
Fluid	1.63	404.7	660	121	197
Actuator	12.60	481.0	6061	198	2495
Supports - Tail	.29	468.1	136	184	53
Supports - Body	.12	374.5	45	89	11
System Controls - V.T.O.L.	(186.81)	197.9	(36968)	98	(18247)
Pitch System	(35.38)	110.6	(3913)	91	(3218)
Mechanical Controls	10.83	144.2	1562	87	942
Electrical Operating Mech.	(4.86)	97.5	(474)	103	(499)
Controls	3.70	59.0	218	104	385
Circuitry	.35	216.2	76	94	33
Trim Controls	.81	222.0	180	100	81

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WEIGHT EMPTY - WEIGHT AND BALANCE DETAILS (Cont'd.)					
	WEIGHT	HORIZONTAL		VERTICAL	
		ARM	MOMENT	ARM	MOMENT
SURFACE CONTROLS (Cont'd.)					
System Controls - V.T.O.L. (Cont'd.)					
Pitch System (Cont'd.)					
Hydraulic Operating Mech.	(19.69)	95.3	(1877)	90	(1777)
Plumbing	5.91	111.3	657	95	561
Fluid	.81	111.7	90	93	75
Actuators	9.60	88.0	845	87	835
Supports - Body	3.37	84.7	285	91	306
Yaw System	(2.55)	197.3	(504)	99	(252)
Mechanical Controls	1.26	190.3	240	97	122
Electrical Circuitry	.32	162.1	52	104	33
Trim Controls - Elect.	.97	218.1	212	100	97
Roll System	(1.52)	213.2	(324)	100	(153)
Mechanical Controls	.40	206.0	82	99	40
Electrical Circuitry	.26	167.6	44	100	26
Trim Controls - Electrical	.86	230.3	198	101	87
Lift System	(65.62)	242.0	(15394)	97	(6300)
Mechanical Controls	19.65	247.9	4870	97	1904
Electrical Circuitry	.58	166.5	97	99	58
Thrust Vector Actuator	2.74	220.5	604	100	274
Hydraulic Operating Mech.	(40.65)	241.6	(9823)	98	(3964)
Plumbing	8.36	224.6	1877	99	830
Fluid	.87	207.1	180	99	87
Servo Actuator	24.54	256.0	6282	97	2380
Supports - Wing	6.80	215.7	1467	97	659
Supports - Body	.08	216.2	17	97	8
Common To All Systems	(83.74)	201.0	(16833)	101	(8424)
Mechanical Mixer	34.94	225.7	7885	100	3480
Electrical Circuitry	6.64	172.7	1147	105	700
Circuitry Interlock	14.68	241.7	3548	112	1640
Electrical Mixer	27.04	154.8	4185	95	2504
Supports - Body	.44	155.4	68	91	40

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WEIGHT EMPTY - WEIGHT AND BALANCE DETAILS (Cont'd.)

	WEIGHT	HORIZONTAL		VERTICAL	
		ARM	MOMENT	ARM	MOMENT
ENGINE SECTION	(44.39)	249.9	(11092)	139	(6148)
Engine Mounts	14.34	251.6	3608	140	2007
Firewall	30.05	249.1	7484	138	4141
PROPULSION GROUP	(3435.85)	235.4	(808761)	116	(399390)
Main Propulsion - Gas Generator	(1221.85)	241.3	(294768)	143	(174427)
Engine - G.E. J85-GE-5B (2)	923.00	224.8	207490	147	135681
Accessory Gear Box & Drive	(28.24)	195.8	(5528)	137	(3864)
Gear Box	19.60	192.4	3770	137	2680
Flex Shaft - Accessory Drive	8.64	203.5	1758	137	1184
Air Induction System	(57.73)	186.9	(10790)	147	(8476)
Air Intake Duct	56.28	186.3	10484	147	8258
Compressor Bleed Duct	1.45	211.0	306	151	218
Exhaust System	(212.88)	333.3	(70961)	124	(26406)
Tailpipe	148.90	322.6	48037	128	19099
Tailpipe Shroud & Insulation	50.67	343.4	17401	120	6068
Supports	.30	287.0	86	134	40
Thrust Spoiler Doors	7.57	418.1	3165	92	696
Thrust Spoiler Linkage	5.44	417.6	2272	92	503
Main Propulsion - Lift Fan	(1746.54)	255.8	(446720)	102	(177813)
Lift Fan - G.E. X353-5B (2)	1616.38	256.0	413793	101	163254
Fan Mounts	8.06	244.8	1973	104	838
Air Induction System	(122.10)	253.5	(30954)	112	(13721)
Crossover Ducting	100.28	253.5	25423	112	11194
Duct Insulation	6.79	256.0	1738	117	794
Duct Supports	15.03	252.3	3793	115	1733
Auxiliary Propulsion - Pitch Fan	(311.14)	97.8	(30419)	94	(29153)
Pitch Fan - G.E. X376 (1)	114.40	61.2	7001	100	11440
Fan Mounts	2.27	79.1	179	101	229
Air Induction System	(139.38)	142.4	(19848)	93	(12914)

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WEIGHT EMPTY - WEIGHT AND BALANCE DETAILS
(Cont'd.)

PROPULSION GROUP (Cont'd.)

Auxiliary Propulsion - Pitch Fan
(Cont'd.)

Air Induction System (Cont'd.)

	WEIGHT	ARM	MOMENT	ARM	MOMENT
Air Ducts	78.70	168.0	13221	87	6838
Duct Supports	5.74	171.1	982	89	514
Duct Shrouding	20.66	167.2	3454	85	1750
Intake Bellmouth	19.36	61.9	1198	111	2149
Intake Louvers	14.92	66.6	993	111	1663

Exhasut System	(55.09)	61.5	(3391)	83	(4570)
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Pitch Thrust Reverser	46.54	57.3	2667	83	3847
Thrust Reverser Linkage	8.55	84.7	724	85	723

Lubricating & Fuel System	(112.13)	241.0	(27018)	117	(13128)
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Main Fuel System	(109.94)	241.1	(26507)	117	(12874)
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Forward Tank (262 gal.)	18.88	187.4	3539	112	2114
Aft Tank (134 gal.)	30.89	297.5	9190	117	3621
Backing Board - Fwd. Tank	8.85	188.7	1670	111	982
Tank Supports	2.80	299.4	838	113	316
Boost Pumps & Elect. Controls	13.82	220.6	3049	108	1499
Ground Filling System	4.33	214.8	930	130	564
Engine Drain System	4.67	236.3	1104	120	560
Distribution System	18.76	220.2	4131	122	2296
Vent System	5.19	331.7	1722	139	724
Low Pressure Warning System	1.75	191.0	334	113	198

Auxiliary Fuel System	(2.19)	233.2	(511)	116	(254)
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Tank Supports	2.19	233.2	511	116	254
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Oil System - Integral With Engine

Engine Controls	(38.11)	221.3	(8435)	109	(4156)
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Ignition	.54	167.7	91	120	65
Throttle	17.38	149.3	2595	108	1874
Diverter Valve	11.77	216.6	2549	125	1466
Thrust Spoiler	8.42	380.1	3200	89	751

Starting System - Air Impingement	6.08	230.4	1401	117	713
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WEIGHT EMPTY - WEIGHT AND BALANCE DETAILS (Cont'd.)					
	WEIGHT	HORIZONTAL		VERTICAL	
		ARM	MOMENT	ARM	MOMENT
INSTRUMENTS	(71.09)	163.8	(11645)	120	(8535)
Accelerometer	.66	106.0	70	121	80
Machmeter	(2.04)	115.7	(236)	121	(247)
Indicator	1.65	105.2	174	124	204
Wiring	.39	158.4	62	111	43
Altimeter	1.31	105.0	138	124	162
Attitude	(3.07)	106.2	(326)	121	(370)
Indicator	2.86	106.0	303	121	346
Wiring	.21	110.5	23	115	24
Airspeed - Low Speed	.60	105.0	63	124	74
Rate of Climb Indicator	1.46	105.0	153	123	180
Landing Gear Warning Indicator	.05	110.0	5	116	6
Turn and Bank	(1.31)	109.2	(143)	115	(150)
Indicator	1.20	109.0	131	115	138
Wiring	.11	111.9	12	112	12
Flap - Thrust Spoiler Position	(2.31)	217.7	(503)	108	(249)
Indicator	.57	107.5	61	120	68
Transmitter	.10	410.0	41	100	10
Wiring	1.64	244.5	401	104	171
Standby Compass	(.87)	106.9	(93)	129	(112)
Indicator	.72	107.0	77	129	93
Installation	.15	104.5	16	129	19
Landing Gear Position	(1.75)	167.4	(293)	103	(180)
Indicator	.32	110.5	35	112	36
Wiring	1.43	180.6	258	101	144
Fuel Quantity	(7.97)	196.9	(1569)	119	(946)
Indicator	1.82	140.5	256	116	211
Transmitters	3.77	228.0	860	117	442
Wiring	2.38	190.5	453	123	293
Fuel Flow	(8.84)	172.7	(1527)	130	(1146)
Indicator	1.40	108.5	152	120	168
Transmitters	4.90	196.0	960	132	647
Wiring	2.54	163.3	415	130	331
Oil Pressure	(7.07)	198.3	(1402)	134	(950)
Indicator	.63	109.5	69	118	74
Transmitters	2.70	232.0	626	144	389
Wiring	3.74	189.0	707	130	487
Engine Tachometers (2)	(2.06)	137.9	(284)	129	(265)
Indicators	.98	108.5	106	124	122
Wiring	1.08	164.6	178	132	143
Hydraulic Pressure	(5.06)	145.8	(738)	127	(642)
Indicator	.87	120.4	105	123	107
Transmitter	3.00	156.5	470	131	393
Wiring	1.19	137.1	163	120	142
Pitot System	9.39	189.9	1783	103	972
Clock	.43	109.5	47	115	49

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WEIGHT EMPTY - WEIGHT AND BALANCE DETAILS (Cont'd.)					
		HORIZONTAL		VERTICAL	
WEIGHT		ARM	MOMENT	ARM	MOMENT
INSTRUMENTS (Cont'd.)					
Alpha Meter - Angle of Attack	.63	108.5	68	118	74
Angle of Yaw	.63	108.5	68	118	74
Vector Angle	.26	107.0	28	120	31
Exhaust Temperature	(5.73)	153.1	(571)	123	(457)
Indicator - Dual	1.35	108.5	146	122	165
Wiring	2.38	178.7	425	123	292
Rudder, Aileron, Stab. Position	(4.13)	211.1	(872)	118	(488)
Indicator	1.11	108.5	120	115	128
Wiring	3.02	249.2	752	119	360
Louver Position	(1.27)	107.9	(137)	116	(147)
Indicator	1.11	108.5	120	115	128
Wiring	.16	109.0	17	118	19
Master Caution Panel	(2.90)	132.4	(384)	117	(338)
Indicator	.13	108.5	14	122	16
Panel	1.41	109.0	154	121	171
Wiring	1.36	158.5	216	111	151
Attaching Hardware	.58	109.0	63	118	68
Switches, Etc.	.71	114.0	81	110	78
HYDRAULIC AND PNEUMATIC GROUP		(111.48)	183.7	(20482)	122 (13652)
Hydraulic Utility System		(109.52)	184.0	(20148)	123 (13476)
Pumps, Engine Driven (2)	14.32	174.8	2503	140	2005
Oil Coolers (2)	6.10	176.2	1075	135	823
Reservoirs (2)	14.30	165.1	2361	128	1830
Accumulators (2)	7.43	171.4	1274	127	944
Accumulator Charge Fittings	.80	171.2	137	129	103
Filters	6.64	168.0	1116	135	894
Pressure Switch	.74	159.9	118	128	95
Valves	(3.23)	171.8	(555)	128	(412)
Check	.16	177.7	28	140	22
Relief	2.92	171.5	501	127	371
Control	.15	171.4	26	127	19
Temperature Indication	.94	149.9	141	145	136
Low Pressure Warning	.38	143.4	54	123	47
Quick Disconnects	1.04	157.5	164	124	129
Plumbing	21.46	208.0	4463	112	2401
Fluid in System	25.62	203.1	5203	113	2898
Supports - Body	6.52	151.0	984	116	759
Pneumatic Emergency System		(1.96)	170.6	(334)	90 (176)
Plumbing	1.96	170.6	334	90	176

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WEIGHT EMPTY - WEIGHT AND BALANCE DETAILS (Cont'd.)

	WEIGHT	HORIZONTAL		VERTICAL	
		ARM	MOMENT	ARM	MOMENT
ELECTRICAL GROUP	(194.05)	253.9	(49274)	118	(22816)
A. C. System	(5.80)	326.3	(1892)	109	(633)
Power Conversion	(.81)	146.5	(119)	102	(83)
Transformer	.81	146.5	119	102	83
Distribution & Controls	(3.88)	381.3	(1479)	112	(435)
Relays	2.28	458.1	1044	117	267
Wiring	.84	300.7	253	107	90
Conduit	.76	240.0	182	103	78
Lights and Signals	(1.11)	265.2	(294)	104	(115)
Wiring for Exterior Lights	1.11	265.2	294	104	115
D. C. System	(188.25)	251.7	(47382)	118	(22183)
Power Supply	(92.96)	243.5	(22634)	133	(12388)
Generators 165 AMP (2)	74.00	185.0	13690	139	10286
Battery (1)	18.00	471.7	8491	111	1998
Battery Supports	.96	471.8	453	109	104
Power Conversion	(28.41)	432.5	(12287)	110	(3115)
Static Inverter (2)	24.06	455.7	10964	110	2647
Wiring	4.35	304.2	1323	108	468
Distribution and Controls	(60.47)	183.7	(11106)	100	(6030)
Generator Controls	13.24	150.2	1988	93	1232
Volt-Ammeter	1.06	120.0	127	100	106
Switches, Rheostats & Panels	.27	120.0	32	100	27
Circuit Breaker & Fuses	9.57	132.3	1266	94	900
Junction Fuse & Dist. Boxes	1.78	130.4	232	95	168
Receptacles & Connectors	1.84	156.4	288	88	162
Relays	7.11	199.2	1416	103	735
Wiring	23.25	220.8	5133	105	2446
Conduit	1.87	251.9	471	108	203
Bonding Installations	.48	318.5	153	106	51
Equipment Supports	(6.41)	211.3	(1355)	102	(650)
Distribution Box	1.98	146.5	290	102	202
Equipment Supports - Wing	1.08	204.7	221	101	109
Equipment Supports - Body	3.35	251.9	844	101	339

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WEIGHT EMPTY - WEIGHT AND BALANCE DETAILS (Cont'd.)

	WEIGHT	HORIZONTAL		VERTICAL	
		ARM	MOMENT	ARM	MOMENT
ELECTRONICS	(38.99)	153.3	(5979)	95	(3706)
UHF Transceiver, ARC-51X	(38.99)	153.4	(5979)	95	(3706)
Equipment	(37.77)	153.2	(5786)	95	(3602)
Transceiver	(30.30)	158.5	(4803)	95	(2877)
Radio, RT-702/ARC-51X	27.90	158.5	4422	95	2650
Mount, MT-2653	.40	158.5	63	92	37
Cooler, HD-615/ARC-51X	1.00	158.5	159	95	95
Indicator, ID-1003/ARC-51X	1.00	158.5	159	95	95
Antenna, AT256A/ARC	1.54	162.0	249	66	102
Control Unit C3984/ARC-51	3.00	110.0	330	115	345
Cabling	2.93	138.0	404	95	278
Installation	(1.22)	158.6	(193)	86	(104)
Transceiver	.89	157.3	140	91	81
Antenna	.33	162.0	53	71	23
FURNISHINGS AND EQUIPMENT	(231.28)	152.5	(35260)	112	(25968)
Accommodations For Personnel	(188.51)	142.1	(26794)	112	(21116)
Pilot's Seat - North American LW-2	(170.80)	141.4	(24147)	112	(19137)
Seat 9142-53009	138.50	140.0	19390	111	15374
Seat Adjusting Mechanism	5.96	152.0	906	130	775
Bulkhead Fittings (2)	3.10	145.5	451	106	329
Speed Sensor	.69	149.0	103	111	77
Rocket Catapult	21.75	147.0	3197	115	2501
Initiators T-3OE2 (2)	.70	122.0	85	100	70
Cartridges (4)	.10	147.0	15	106	11
Seat Tracks & Supports	17.71	149.5	2647	112	1979
Miscellaneous Equipment	(9.66)	112.3	(1085)	108	(1045)
Instrument Panel	2.81	109.3	307	117	330
Instrument Panel Supports	1.54	106.5	164	115	178
Consoles	5.31	115.6	614	101	537

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WEIGHT EMPTY - WEIGHT AND BALANCE DETAILS (Cont'd.)

FURNISHINGS AND EQUIPMENT (Cont'd.)

Emergency Equipment

Fire Extinguishing System

Bottles (Including Charge)

Controls

Plumbing

Bottle Supports

Fire Detection System

Structure Overheat Warning

AIR CONDITIONING & ANTI-ICING

Air Conditioning System

Cooling System

Fans (2)

Ducting

Plenum Chamber

Supports - Body

Anti-Icing

Engine Anti-Icing Wiring

AUXILIARY GEAR

Handling

Jacking Fittings

Arresting Gear

Decelerating Parachute

Chute Container & Fittings

Chute Controls

WEIGHT	HORIZONTAL		VERTICAL	
	ARM	MOMENT	ARM	MOMENT
(33.11)	222.9	(7381)	115	(3807)
(20.65)	223.5	(4616)	114	(2359)
12.44	219.0	2724	112	1393
3.08	244.3	753	115	354
4.93	222.4	1096	119	589
.20	216.5	43	114	23
8.24	217.8	1795	123	1011
4.22	230.0	970	104	437
(30.94)	193.2	(5977)	137	(4242)
(29.82)	193.1	(5759)	137	(4094)
(29.82)	193.1	(5759)	137	(4094)
11.59	192.0	2226	137	1588
13.06	197.2	2575	138	1805
4.99	184.1	919	136	677
.18	214.0	39	132	24
(1.12)	194.4	(218)	132	(148)
1.12	194.4	218	132	148
(27.20)	448.9	(12209)	106	(2896)
(.49)	386.6	(189)	87	(43)
.49	386.6	189	87	43
(26.71)	450.0	(12020)	107	(2853)
13.60	500.0	6800	110	1496
5.37	485.0	2604	108	579
7.74	338.0	2616	101	778

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2.7 Instrumentation

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INSTRUMENTATION

	WEIGHT	HORIZONTAL		VERTICAL	
		ARM	MOMENT	ARM	MOMENT
Nose Boom	5.60	- 1.91	- 11	94.	526
Fan Overspeed Control	8.32	121.91	1014	106.	880
Circuitry Fan Bearing Heat	5.11	165.11	844	95.	486
Circuitry Fan RPM & Limit	10.71	159.75	1711	94.	1011
Auto Stab. System Instrumentation	1.70	109.00	185	112.	190
G.E. Fan Slip Rings (2)	21.08	204.25	4306	101.	2123
Tubing for Static Test Wiring	.28	212.86	60	102.	29
* Sub Total	* 52.80	153.58	8109	99.	5245
D023 Temp. Measurement Instl.	2.32	240.00	557	100.	232
D020 Signal Access & Harn. Standoffs	2.03	242.00	491	120.	244
D021 Oat Probe Installation	1.16	256.03	297	104.	120
D022 Probe - Nose, Yaw & Angle	2.14	- 75.70	- 162	95.	203
D025 Probe - Hyd. Temp.	.54	165.00	89	128.	69
D026 Transducer Installation	1.39	1.44	2	95.	132
D027 Pos. Potentiometer	.24	495.83	119	113.	27
D028 Pos. Potentiometer-Rudder	.35	494.28	173	114.	40
D029 Pos. Potentiometer-Aileron	.45	299.00	135	104.	47
D030 Force Transducers	.09	122.22	11	100.	9
D031 Pos. Potentiometer-Aileron Tab	.07	317.70	22	102.	7
D033 Pot.-Fwd Louver Servo-Fan Exit	.42	211.00	89	97.	41
D034 Pot.-Aft Louver Servo-Fan Exit	.42	300.00	126	97.	41
D035 Photo Recorder Installation	49.65	100.95	5012	97.	4826
D036 Pot.-Pitch Fan Exit Door	.22	88.00	19	87.	19
D037 Pos. Potentiometer-Rudder Hinge	.11	513.00	56	183.	20
D038 Pos. Potentiometer-Throttle	.60	111.67	67	97.	58
D039 Potentiometer-Stick-Long. & Lat.	.45	113.33	51	87.	39
D040 Potentiometer-Rudder Pedal	.28	94.00	26	110.	31
D041 Post.-Potentiometer-Control Col.	.26	140.00	36	87.	23
D044 C.G. Accel. Mtng. Box	9.54	241.71	2306	121.	1159
D045 Accels.-Wing & Tail	1.40	380.00	532	141.	198
D047 Inverter Elapsed Time	.23	455.00	105	113.	26
D049 Equip.-Data Acquisition					
PCM Package	65.00	145.00	9425	108.	7020
Vertical Gyro	5.00	115.00	575	96.	480
Rate Gyro	3.85	105.00	404	95.	366
Analog Record Electronics	10.00	99.00	990	95.	950
Tape Transport	25.00	98.7	2467	94.	2350
Telemetry Package	22.50	114.0	2565	94.	2115
Telemetry Package	22.50	145.0	3263	105.	2363
D050 Signal Conditioner	51.00	128.5	6554	105.	5355
Temp Syst. Instl. Box	10.00	128.5	1285	99.	990
-3 Fwd Mounting Board	11.00	108.0	1188	93.	1023
-5 Aft Mounting Board	5.40	130.0	702	94.	508
D051 Antenna-Telemetry	.81	136.5	111	71.	58
D054 Wiring	105.31	220.57	23228	103.	10808
D057 Press. Probes-Cooling Syst.	11.75	202.00	2374	112.	1316

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INSTRUMENTATION (Continued)

	WEIGHT	HORIZONTAL		VERTICAL	
		ARM	MOMENT	ARM	MOMENT
D058 Pos. Potentiometer-Elevator	.09	518.00	47	206.	19
D059 Accelerometers-Flutter	15.41	288.58	4447	117.	1808
* Sub Total	*438.98	158.97	69784	103.	45140
TOTAL INSTRUMENTATION	491.78	158.39	77893	102.	50385

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INSTRUMENTATION CONFIGURATIONS FOR FLIGHT TEST

	WEIGHT	HORIZONTAL		VERTICAL	
		ARM	MOMENT	ARM	MOMENT
Total Instrumentation	491.78	158.39	77,893	102.	50,385
Delete: D059 Accel.-Flutter	-15.41	288.58	- 4,447	117.	- 1,808
Telemetry Pkg.-2nd	-22.50	145.00	- 3,263	105.	- 2,363
D035 Photo Recorder	-49.65	100.95	- 5,012	97.	- 4,826
<u>STANDARD INSTRUMENTATION CONFIGURATION</u>	404.22	161.23	65,171	102.	41,388
Total Instrumentation	491.78	158.39	77,893	102.	50,385
Delete: D059 Accel.-Flutter	-15.41	288.58	- 4,447	117.	- 1,808
Telemetry Pkg.-2nd	-22.50	145.00	- 3,263	105.	- 2,363
<u>STANDARD & TEMP. SURVEY INSTRU. CONFIG.</u>	453.87	154.63	70,183	102.	46,214
Total Instrumentation	491.78	158.39	77,893	102.	50,385
Delete: D035 Photo Recorder	-49.65	100.95	- 5,012	97.	- 4,826
Temp. Syst. Box	-10.00	128.50	- 1,285	99.	- 990
P.C.M. Pkg.	-65.00	145.00	- 9,425	108.	- 7,020
<u>FLUTTER & VIBRATION INSTRU. CONFIG.</u>	367.13	169.34	62,171	102.	37,549

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2.8 Moment Change-Landing Gear Extended

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MOMENT CHANGE - LANDING GEAR EXTENSION
(RETRACTABLE ITEM ONLY)

	WEIGHT	HORIZONTAL		VERTICAL	
		ARM	MOMENT	ARM	MOMENT
LANDING GEAR RETRACTED (As Reflected in This Report)	(297.77)		(85044)		(26477)
Main Gear	(238.03)	(328.6)	(78216)	(91.0)	(21655)
Shock Strut, Oil and Axle	88.20	329.0	29019	92	8096
Drag Brace	30.28	311.2	9424	88	2657
Side Brace	10.10	312.6	3157	87	879
Vee Brace	25.57	293.4	7503	91	2320
Retracting Cylinder	7.06	305.7	2158	90	635
Wheels	28.90	352.7	10193	92	2659
Brakes	21.10	352.7	7442	92	1941
Tires	23.70	352.7	8359	92	2180
Hydraulic Hoses, Brackets, etc.	3.12	308.0	961	92	288
Nose Gear	(59.74)	(114.3)	(6828)	(80.7)	(4822)
Shock Strut, Oil & Shimmy Damper	27.75	120.3	3339	78	2166
Braces & Jury Links	8.41	122.2	1028	85	712
Retracting Cylinder	2.18	124.1	271	88	192
Wheel	8.22	99.2	815	83	682
Tire	10.95	99.2	1086	83	909
Aft Door	2.23	129.6	289	72	161

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MOMENT CHANGE - LANDING GEAR EXTENSION (RETRACTABLE ITEMS ONLY)

	WEIGHT	HORIZONTAL		VERTICAL	
		ARM	MOMENT	ARM	MOMENT
LANDING GEAR EXTENDED					
VTOL (Vertical Take-off Position)	(297.77)		(78418)		(17630)
Main Gear	(238.03)	(296.1)	(70472)	(60.0)	(14284)
Shock Strut, Oil & Axle	88.20	292.4	25786	58	5081
Drag Brace	30.28	306.0	9266	75	2274
Side Brace	10.10	292.2	2951	63	636
Vee Brace	25.57	293.4	7503	91	2320
Retracting Cylinder	7.06	318.0	2245	91	642
Wheels	28.90	296.0	8554	42	1214
Brakes	21.10	296.0	6246	42	886
Tires	23.70	296.0	7015	42	995
Hydraulic Hoses, Brackets, etc.	3.12	290.4	906	76	236
Nose Gear	(59.74)	(133.0)	(7946)	(56.0)	(3346)
Shock Strut, Oil & Shimmy Damper	27.75	135.8	3768	58	1610
Braces & Jury Links	8.41	119.6	1006	76	642
Retracting Cylinder	2.18	117.1	255	78	170
Wheel	8.22	135.6	1115	41	337
Tire	10.95	135.6	1485	41	449
Aft Door	2.23	142.0	317	62	138

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MOMENT CHANGE - LANDING GEAR EXTENSION (RETRACTABLE ITEMS ONLY)

	WEIGHT	HORIZONTAL		VERTICAL	
		ARM	MOMENT	ARM	MOMENT
LANDING GEAR EXTENDED CTOL (Conventional Take-off Position)	(297.77)		(75139)		(17361)
Main Gear	(238.03)	(282.3)	(67193)	(58.9)	(14015)
Shock Strut, Oil & Axle	88.20	278.3	24544	58	5081
Drag Brace	30.28	297.1	8997	70	2106
Side Brace	10.10	280.0	2828	63	636
Vee Brace	25.57	291.1	7444	88	2261
Retracting Cylinder	7.06	305.4	2156	85	600
Wheels	28.90	276.0	7976	42	1214
Brakes	21.10	276.0	5824	42	886
Tires	23.70	276.0	6541	42	995
Hydraulic Hoses, Brackets, etc.	3.12	283.0	883	76	236
Nose Gear - Same as VTOL	(59.74)		(7946)		(3346)

SUMMARY - MOMENT CHANGE

RETRACTED TO VTOL			
Retracted Main and Nose	85044		26477
VTOL Main and Nose	78418		17630
MOMENT CHANGE: RETRACTED TO VTOL	- 6626		- 8847
RETRACTED TO CTOL			
Retracted Main and Nose	85044		26477
CTOL Main and Nose	75139		17361
MOMENT CHANGE: RETRACTED TO CTOL	- 9905		- 9116
VTOL Position	78418		17630
CTOL Position	75139		17361
Δ MOMENT CHANGE: VTOL TO CTOL	- 3279		- 269

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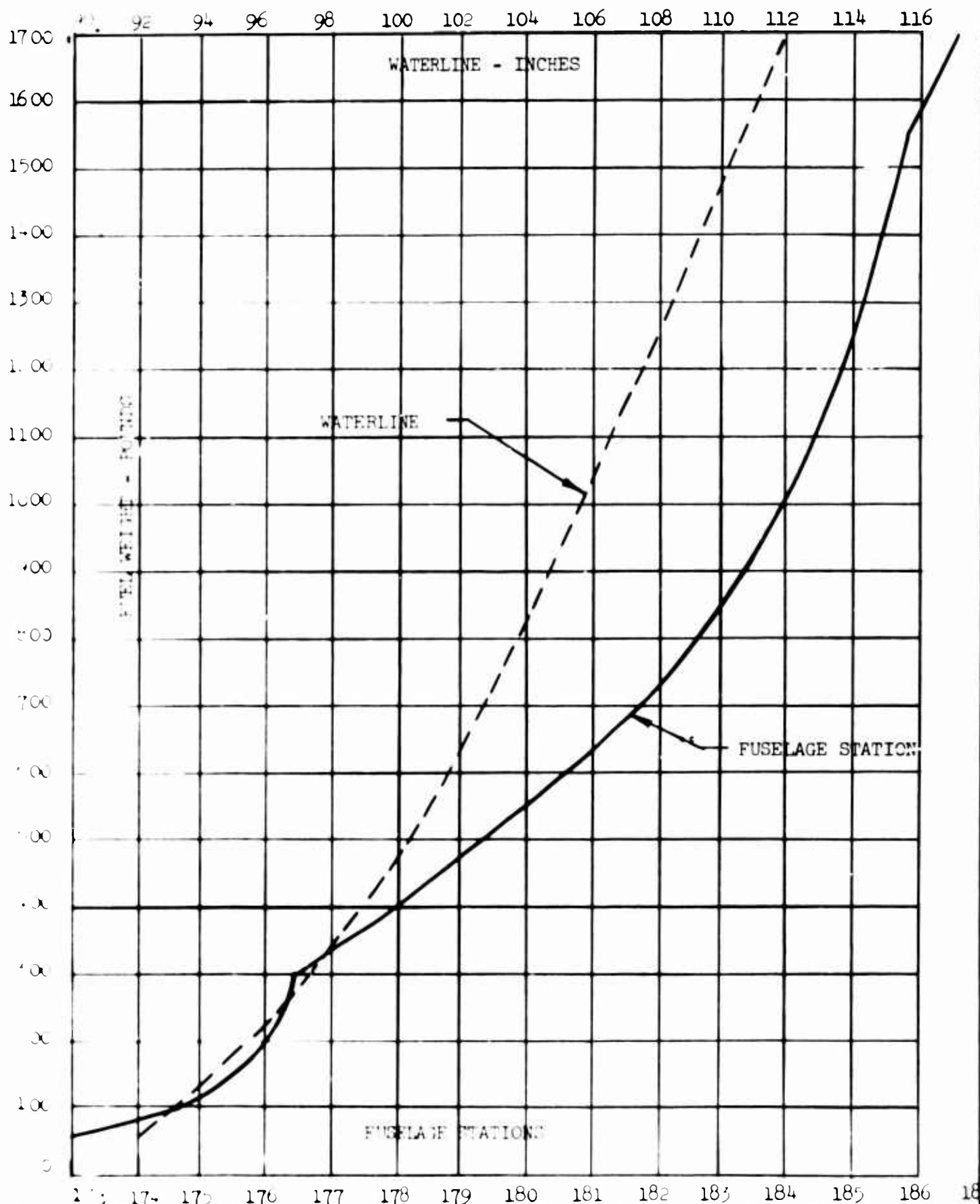
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2.9 Fuel Center of Gravity Graphs

FUEL CENTER OF GRAVITY TRAVEL

FWD. MAIN TANK

Figure 3



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FUEL CENTER OF GRAVITY TRAVEL

AFT MAIN TANK

WATERLINE - INCHES

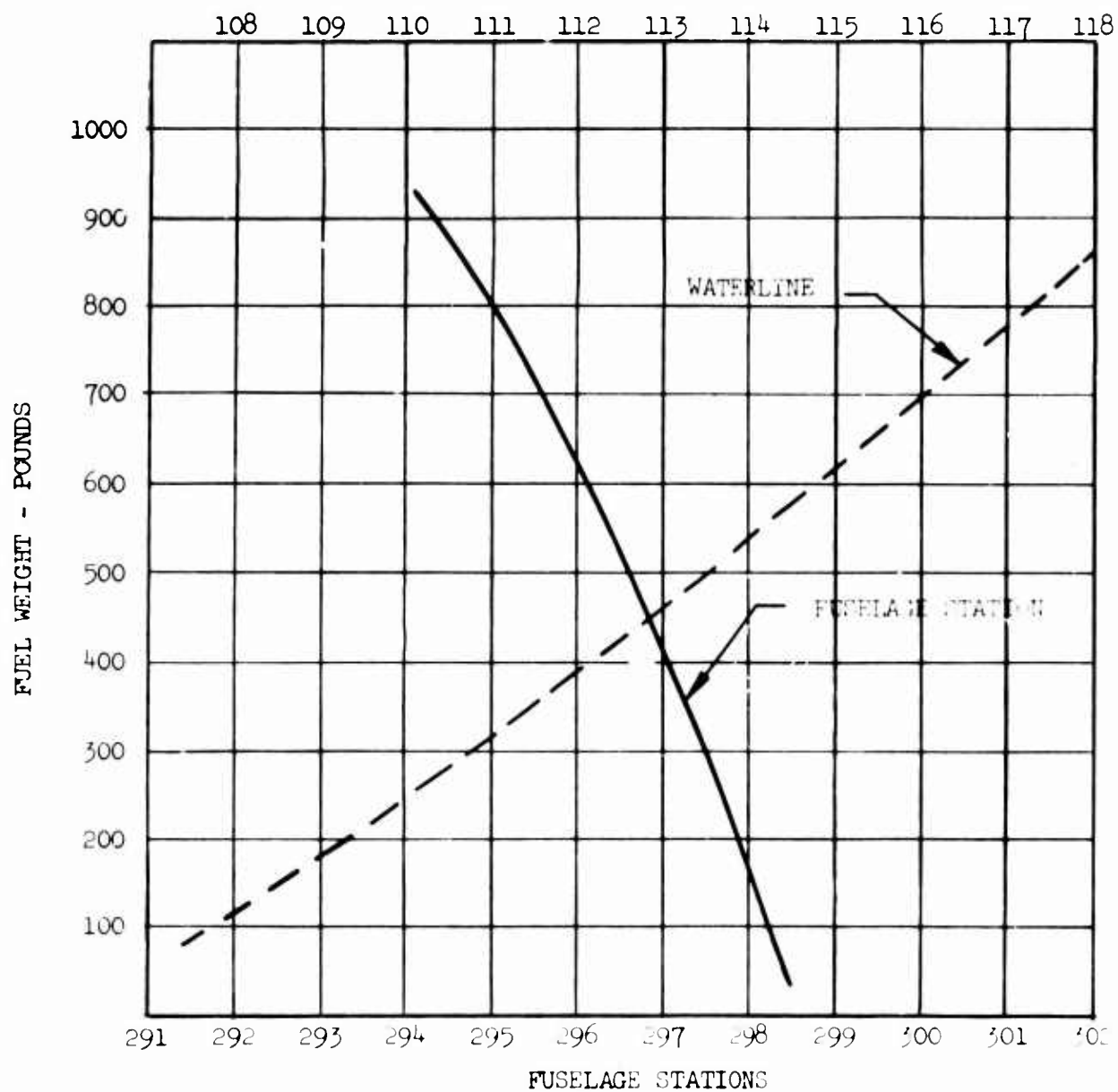


Figure 4

FUEL CENTER OF GRAVITY TRAVEL
DORSAL AUXILIARY FUEL TANK

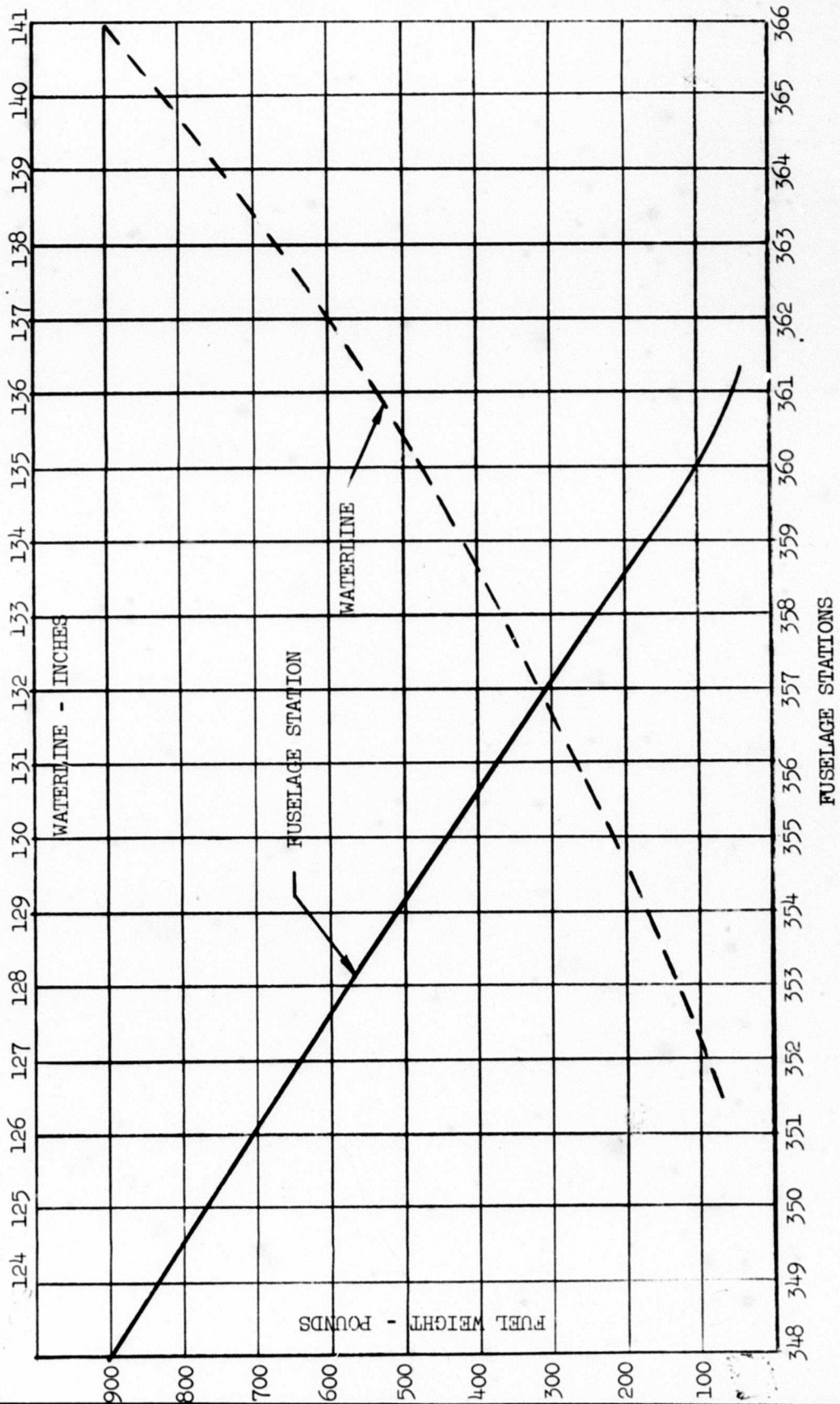


Figure 5

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2.10 Gross Weight Balance Calculations

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GROSS WEIGHT - 45 MINUTE MISSION

	WEIGHT	HORIZONTAL		VERTICAL	
		ARM	MOMENT	ARM	MOMENT
WEIGHT EMPTY (Gear Up)	7541	248.4	1873188	113	855864
Crew	180	137	24660	111	19980
Fuel - Unusable - Fwd.	30	172	5160	92	2760
Fuel - Unusable - Aft	15	302.9	4543	105	1575
Oil - Trapped	3	204	612	136	408
Oil - Engine	12	204	2448	136	1632
Standard Instrumentation	404	161.2	65171	102	41388
Usable Fuel					
Forward Main Tank	817	182.7	149266	104	84968
Aft Main Tank	818	294.9	241228	117	95706
GROSS WEIGHT - 45 Minute Mission	9820	240.9	2366276	112	1104281
$\frac{240.9 - 211.14}{112.92} =$	26.4% M.A.C.				
Extend Gear to VTOL Position			- 6626		- 8847
GROSS WEIGHT - 45 Minute - VTOL	9820	240.3	2359650	112	1095434
$\frac{240.3 - 211.14}{112.92} =$	25.8% M.A.C.				
Δ Change - Gear - VTOL to CTOL			- 3279		- 269
GROSS WEIGHT - 45 Minute - CTOL	9820	240.0	2356371	112	1095165
$\frac{240.0 - 211.14}{112.92} =$	25.6% M.A.C.				

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GROSS WEIGHT - 20 MINUTE MISSION

	WEIGHT	HORIZONTAL		VERTICAL	
		ARM	MOMENT	ARM	MOMENT
WEIGHT EMPTY (Gear Up)	7541	248.4	1873188	113	855864
Crew	180	137	24660	111	19980
Fuel - Unusable - Fwd.	30	172	5160	92	2760
Fuel - Unusable - Aft	15	302.9	4543	105	1575
Oil - Trapped	3	204	612	136	408
Oil - Engine	12	204	2448	136	1632
Standard Instrumentation	404	161.2	65171	102	41388
Usable Fuel					
Forward Main Tank	472	178.7	84346	100	47200
Aft Main Tank	473	296.7	140339	113	53449
GROSS WEIGHT - 20 Minute Mission	9130	241.0	2200467	112	1024256
$\frac{241.0 - 211.14}{112.92} =$			26.4% M.A.C.		
Extend Gear to VTOL Position			- 6626		- 8847
GROSS WEIGHT - 20 Minute - VTOL	9130	240.3	2193841	111	1015409
$\frac{240.2 - 211.14}{112.92} =$			25.7% M.A.C.		
Δ Change - Gear - VTOL TO CTOL			- 3279		- 269
GROSS WEIGHT - 20 Minute - CTOL	9130	240.0	2190562	111	1015240
$\frac{240.0 - 211.14}{112.92} =$			25.6% M.A.C.		

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GROSS WEIGHT 9200 LBS. - INCLUDING INSTRUMENTATION

	WEIGHT	HORIZONTAL		VERTICAL	
		ARM	MOMENT	ARM	MOMENT
WEIGHT EMPTY (Gear Up)	7541	248.4	1873188	113	855864
Crew	180	137	24660	111	19980
Fuel - Unusable - Fwd.	30	172	5160	92	2760
Fuel - Unusable - Aft	15	302.9	4543	105	1575
Oil - Trapped	3	204	612	136	408
Oil - Engine	12	204	2448	136	1632
Standard Instrumentation	404	161.2	65171	102	41388
Usable Fuel					
Forward Main Tank	507	179.3	90905	100	50700
Aft Main Tank	508	296.5	150622	114	57912
GROSS WEIGHT - 9200 Lbs. (Gear Up)	9200	241.0	2217309	112	1032219
$\frac{241.0 - 211.14}{112.92} =$			26.4% M.A.C.		
Extend Gear to VTOL Position			- 6626		- 8847
GROSS WEIGHT - 9200 Lbs. - VTOL	9200	240.3	2210683	111	1023372
$\frac{240.3 - 211.14}{112.92} =$			25.8% M.A.C.		
Δ Change - Gear - VTOL to CTOL			- 3279		- 269
GROSS WEIGHT - 9200 Lbs. - CTOL	9200	240.0	2207404	111	1023103
$\frac{240.0 - 211.14}{112.92} =$			25.6% M.A.C.		

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GROSS WEIGHT 9200 LBS. - NO INSTRUMENTATION																																																																				
WEIGHT EMPTY (Gear Up) Crew Fuel - Unusable - Fwd. Fuel - Unusable - Aft Oil - Trapped Oil - Engine Usable Fuel Forward Main Tank Aft Main Tank GROSS WEIGHT - 9200 Lbs. (Gear Up) <div style="margin-left: 40px;"> $\frac{244.5 - 211.14}{112.92} =$ </div>	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th rowspan="2">WEIGHT</th> <th colspan="2">HORIZONTAL</th> <th colspan="2">VERTICAL</th> </tr> <tr> <th>ARM</th> <th>MOMENT</th> <th>ARM</th> <th>MOMENT</th> </tr> </thead> <tbody> <tr> <td>7541</td> <td>248.4</td> <td>1873188</td> <td>113</td> <td>855864</td> </tr> <tr> <td>180</td> <td>137</td> <td>24660</td> <td>111</td> <td>19980</td> </tr> <tr> <td>30</td> <td>172</td> <td>5160</td> <td>92</td> <td>2760</td> </tr> <tr> <td>15</td> <td>302.9</td> <td>4543</td> <td>105</td> <td>1575</td> </tr> <tr> <td>3</td> <td>204</td> <td>612</td> <td>136</td> <td>408</td> </tr> <tr> <td>12</td> <td>204</td> <td>2448</td> <td>136</td> <td>1632</td> </tr> <tr> <td>240</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>709</td> <td>181.7</td> <td>128825</td> <td>103</td> <td>73027</td> </tr> <tr> <td>710</td> <td>295.5</td> <td>209805</td> <td>116</td> <td>82360</td> </tr> <tr> <td>9200</td> <td>244.5</td> <td>2249241</td> <td>113</td> <td>1037606</td> </tr> <tr> <td colspan="5" style="text-align: center;">29.5% M.A.C.</td> </tr> </tbody> </table>				WEIGHT	HORIZONTAL		VERTICAL		ARM	MOMENT	ARM	MOMENT	7541	248.4	1873188	113	855864	180	137	24660	111	19980	30	172	5160	92	2760	15	302.9	4543	105	1575	3	204	612	136	408	12	204	2448	136	1632	240					709	181.7	128825	103	73027	710	295.5	209805	116	82360	9200	244.5	2249241	113	1037606	29.5% M.A.C.				
WEIGHT	HORIZONTAL		VERTICAL																																																																	
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9200	244.5	2249241	113	1037606																																																																
29.5% M.A.C.																																																																				
Extend Gear to VTOL Position GROSS WEIGHT - 9200 Lbs. - VTOL <div style="margin-left: 40px;"> $\frac{243.8 - 211.14}{112.92} =$ </div>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tbody> <tr> <td></td> <td></td> <td>- 6626</td> <td></td> <td>- 8847</td> </tr> <tr> <td>9200</td> <td>243.8</td> <td>2242615</td> <td>112</td> <td>1028759</td> </tr> <tr> <td colspan="5" style="text-align: center;">28.9% M.A.C.</td> </tr> </tbody> </table>						- 6626		- 8847	9200	243.8	2242615	112	1028759	28.9% M.A.C.																																																					
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Δ Change - Gear VTOL to CTOL GROSS WEIGHT - 9200 Lbs. - CTOL <div style="margin-left: 40px;"> $\frac{243.4 - 211.14}{112.92} =$ </div>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tbody> <tr> <td></td> <td></td> <td>- 3279</td> <td></td> <td>- 269</td> </tr> <tr> <td>9200</td> <td>243.4</td> <td>2239336</td> <td>112</td> <td>1028490</td> </tr> <tr> <td colspan="5" style="text-align: center;">28.6% M.A.C.</td> </tr> </tbody> </table>						- 3279		- 269	9200	243.4	2239336	112	1028490	28.6% M.A.C.																																																					
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9200	243.4	2239336	112	1028490																																																																
28.6% M.A.C.																																																																				

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GROSS WEIGHT - FULL FUEL INCLUDING AFT AUXILIARY TANK

	WEIGHT	HORIZONTAL		VERTICAL	
		ARM	MOMENT	ARM	MOMENT
WEIGHT EMPTY (Gear Up)	7541	248.4	1873188	113	855864
Crew	180	137	24660	111	19980
Fuel - Unusable - Fwd.	30	172	5160	92	2760
Fuel - Unusable - Aft	15	302.9	4543	105	1575
Fuel - Unusable - Auxiliary	10	298.5	2985	107	1070
Oil - Trapped	3	204	612	136	408
Oil - Engine	12	204	2448	136	1632
Standard Instrumentation	404	161.2	65171	102	41388
Install Auxiliary Fuel Tank	35	339.0	11865	140	4900
ZERO FUEL - WITH AUX. AFT TANK	8230	241.9	1990632	113	929577
$\frac{241.9 - 211.14}{112.92} =$			27.2% M.A.C.		
Usuable Fuel					
Forward Main Tank - 262 gal.	1703	186.5	317610	112	190736
Aft Main Tank - 134 gal.	870	294.5	256215	111	96570
Aft Auxiliary Tank - 126 gal.	819	349.3	286077	124	101556
	3392				
TOTAL - FULL FUEL (Gear Up)	11622	245.3	2850534	113	1318439
$\frac{245.3 - 211.14}{112.92} =$			30.3% M.A.C.		
Extend Gear to VTOL Position			- 6626		- 8847
GROSS WEIGHT - FULL FUEL - VTOL	11622	244.7	2843908	113	1309592
$\frac{244.7 - 211.14}{112.92} =$			29.7% M.A.C.		
Δ Change - Gear - VTOL to CTOL			- 3279		- 269
GROSS WEIGHT - FULL FUEL - CTOL	11622	244.4	2840629	113	1309323
$\frac{244.4 - 211.14}{112.92} =$			29.5% M.A.C.		

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2.11 Gross Weight Center of Gravity Graph

CENTER OF GRAVITY TRAVEL
DUE TO FUEL CONSUMPTION

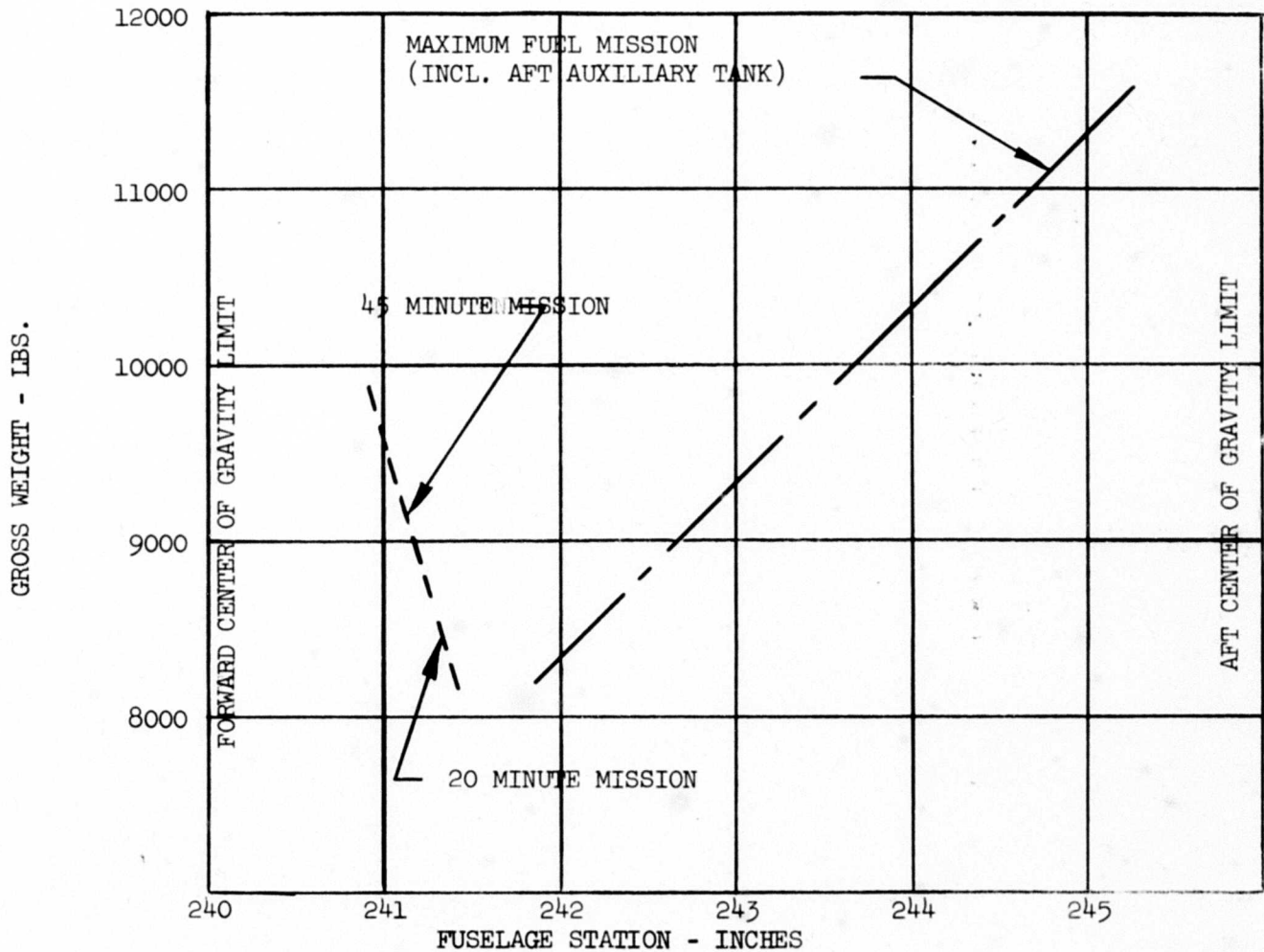


Figure 6

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2.12 Contractor Responsibility Over Or Under Weight

CONTRACTOR RESPONSIBLE OVERWEIGHT/UNDERWEIGHT

Contracted aircraft weight including mock-up review changes	7161.5
Weight additions not contractor responsibility	
Ejection seat interchangeability	15.0
LW-2 seat increase over LW-1 seat	<u>63.5</u>
Total aircraft weight objective	7240.0
Calaculated empty weight per this report	7541.0
Contractor overweight	301.0

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3.0 MOMENT OF INERTIA

3.1 Gross Weight Moment of Inertia Summary

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SUMMARY OF MOMENT OF INERTIA VALUES

	* CONFIGURATION						
	WEIGHT EMPTY (NO INSTRUMENTATION)	20 MINUTE MISSION	45 MINUTE MISSION	DESIGN GROSS WEIGHT 9200 LBS.	DESIGN GROSS WEIGHT 9200 LBS. (LESS INSTRUMENTATION)	ZERO FUEL INCLUDING AUXILIARY FUEL TANK	FULL FUEL INCLUDING AUXILIARY FUEL TANK
1. WEIGHT (POUNDS)	7541	9130	9820	9200	9200	8230	11622
2. HORIZONTAL C.G. (FUS.STA.)	248.4	241.0	240.9	241.0	244.5	241.9	245.3
3. VERTICAL C.G. (WATERLINE)	113.5	112.2	112.5	112.2	112.8	112.9	113.4
4. FUEL (POUNDS)	0	945	1635	1015	1419	0	3392
5. I_{Y_O} (PITCH) SLUG-FT ²	14160	16614	17017	16660	15720	16032	19981
6. I_{X_O} (ROLL) SLUG-FT ²	4193	4313	4319	4316	4241	4306	4596
7. I_{Z_O} (YAW) SLUG-FT ²	16311	18780	19186	18824	17855	18193	22030
8. I_{XZ} (PRODUCT) SLUG-FT ²	946	1160	1206	1172	1082	1118	1708
9. PRINCIPAL AXIS ANGLE THRU C.G.	4°26'	4°33'	4°36'	4°35'	4°31'	4°35'	5°32'

* NOTE: All conditions include 404 lbs. of standard instrumentation equipment unless otherwise noted.

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3.2 Fuselage Moment of Inertia

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MOMENTS OF INERTIA - FUSELAGE AND CONTENTS - WEIGHT EMPTY

SECTION	FUS. STA. BOUNDARIES	WEIGHT	\bar{X}	\bar{Z}	$I_x(\text{Roll})$ LBS. INCH ²	$I_y(\text{Pitch})$ LBS. INCH ²	$I_z(\text{Yaw})$ LBS. INCH ²
1	-10 to 0	.42	- 2.2	94.0	3	2	2
5	0 10	2.33	4.8	93.9	49	42	41
15	10 20	7.95	16.5	94.0	182	175	172
25	20 30	2.14	25.2	94.0	321	165	184
35	30 40	17.22	35.8	92.5	4206	1436	2866
45	40 50	17.59	44.8	92.9	6230	2361	3908
55	50 60	31.60	56.0	98.1	13357	5515	8081
65	60 70	139.45	61.9	99.4	25196	17779	32647
75	70 80	33.01	76.5	92.2	14735	5997	9040
85	80 90	55.23	85.8	90.8	17137	7028	11320
95	90 100	87.62	95.6	98.1	37206	24466	15649
105	100 110	86.92	105.9	110.8	41368	24138	18635
115	110 120	90.74	114.5	103.7	62434	34399	29528
125	120 130	102.00	125.1	96.7	58335	33138	26505
135	130 140	81.89	134.6	99.8	51746	29564	23013
145	140 150	223.08	147.0	109.5	97375	52692	47057
155	150 160	180.79	155.6	104.9	94652	53449	43579
165	160 170	90.01	165.1	112.5	51545	31371	21057
175	170 180	104.53	174.3	121.3	58040	41795	17429
185	180 190	138.10	185.3	127.5	68095	53527	15195
195	190 200	102.36	194.2	123.0	57499	46074	12312
205	200 210	75.59	204.9	116.3	57657	44378	14189
* 215	210 220	878.03	214.9	140.5	400270	252770	410076
225	220 230	72.17	224.5	111.4	48178	32883	16199
235	230 240	55.99	234.2	117.8	50694	36958	14487
245	240 250	73.33	244.4	110.8	53293	33516	21252
** 255	250 260	380.00	256.1	133.8	176573	442073	340928
265	260 270	54.13	264.5	120.4	42108	27927	15026
275	270 280	87.01	275.6	119.8	76909	58133	20384
285	280 290	165.53	285.5	113.4	133220	95878	39335
295	290 300	110.30	295.3	108.0	64523	41868	23945
305	300 310	114.00	305.0	102.8	71877	50464	23095
315	310 320	128.11	315.0	103.9	58285	39225	20411
325	320 330	99.07	324.7	101.8	41416	27676	15370
335	330 340	81.24	334.9	100.9	34854	21409	14380
345	340 350	60.14	344.0	103.9	31076	22112	9684
355	350 360	127.22	352.9	96.7	38275	21618	20512
365	360 370	31.71	365.2	107.2	18085	11853	6652
375	370 380	34.04	374.4	103.5	18589	11776	7380
385	380 390	27.39	384.7	105.5	14269	9056	5705
395	390 400	49.05	394.2	104.9	17973	12619	6050
405	400 410	29.99	404.2	105.9	11705	8258	3929
415	410 420	27.50	415.5	105.8	9583	6957	3045
425	420 430	18.53	424.4	110.3	7146	4984	2323
435	430 440	17.16	434.7	117.7	5263	3644	1782
445	440 450	11.34	444.5	111.7	2597	1353	1386

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MOMENTS OF INERTIA - FUSELAGE AND CONTENTS -
WEIGHT EMPTY (Continued)

SECTION	FUS. STA. BOUNDARIES	WEIGHT	\bar{X}	\bar{Z}	$I_x(\text{Roll})$ LBS. INCH ²	$I_y(\text{Pitch})$ LBS. INCH ²	$I_z(\text{Yaw})$ LBS. INCH ²
455	450 to 460	42.99	455.6	112.5	3456	2281	1346
465	460 470	9.20	465.3	116.3	1273	904	444
475	470 480	28.79	472.8	111.7	950	733	480
485	480 490	15.06	485.7	110.6	613	510	224
495	490 500	7.70	494.8	111.0	110	99	46
505	500 510	9.24	504.6	110.7	195	229	48
515	510 520	3.47	513.8	113.5	8	16	16
TOTAL		4520.0	227.4	116.4	3390265	42706268	40974346

* INCLUDES FORWARD ENGINE REACTION OF 705.63 Lbs.

** INCLUDES AFT ENGINE REACTION OF 217.37 Lbs.

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3.3 Wing Moment of Inertia

MOMENTS OF INERTIA - WING AND CONTENTS -
INCLUDING FLAP - LESS AILERON

WING AND CONTENTS - INCLUDING FLAP - LESS AILERON
DATA SHOWN FOR 1/2 WING
LIFT FAN AND MOVEABLE PORTION OF FAN DOORS ARE TREATED AS SEPARATE UNITS

*WEIGHT PANEL NUMBER	WEIGHT POUNDS	HORIZ. C. G. FUS STA	VERT. C. G. WATERLINE	Y SPAN C. G. BUJTOCK LINE	Iy PITCH LB. IN ²	Ix ROLL LB. IN ²	Iz YAW LB. IN ²	Ixz PRODUCT LB. IN ²	Ixy PRODUCT LB. IN ²	Ixy PRODUCT LB. IN ²
1	7.975	273.89	104.41	168.66	1963.2	111.8	2007.8	155.3	52.1	48.7
2	1.610	285.69	105.19	165.54	30.3	33.7	34.6	-0.4	7.4	11.3
3	1.765	295.73	105.44	165.22	17.8	23.4	24.0	1.2	0.3	11.6
4	4.190	264.55	103.96	152.69	92.4	152.4	174.6	-1.3	-9.8	40.8
5	2.680	282.01	104.45	152.00	102.9	102.2	99.6	0.1	0	59.7
6	3.350	295.31	104.96	151.59	59.7	91.8	88.3	1.2	-1.7	41.5
7	6.325	252.83	103.31	135.84	265.6	278.7	401.9	10.8	39.8	68.4
8	5.130	274.06	103.74	135.96	330.6	283.1	295.3	0	19.7	131.5
9	6.655	293.78	102.79	133.70	195.0	246.1	254.6	-1.5	-14.5	104.0
10	12.065	239.84	101.91	117.15	679.2	521.3	806.1	21.3	147.8	157.4
20	10.615	268.63	101.50	119.36	879.8	517.7	763.7	-7.9	32.0	317.2
30	18.280	294.46	101.98	120.99	1611.7	630.1	1839.6	17.5	82.5	207.1
40	4.820	219.36	101.58	98.34	119.5	387.7	473.4	-2.5	151.0	3.5
50	25.145	230.50	100.88	100.47	1187.1	1123.5	1369.1	-51.6	193.7	281.9
60	18.390	262.19	101.42	101.14	1467.6	701.3	1343.2	-5.1	67.2	369.5
70	27.580	296.25	100.09	100.74	3354.3	1267.5	3702.5	-40.6	-551.1	365.4
80	18.505	221.79	100.53	80.76	1141.3	864.3	1405.3	-76.9	158.0	87.6
90	24.280	299.25	100.64	81.37	2481.9	754.6	2686.5	28.4	-124.7	127.5
100	14.390	205.68	101.08	60.72	211.2	1128.4	1201.9	-9.8	76.4	22.9
200	59.960	229.03	104.55	59.34	23084.4	9562.2	27679.8	5218.6	-2285.4	1239.7
300	58.925	287.45	104.07	60.48	23711.8	3851.6	23017.1	-5376.2	-426.6	1194.9
400	7.865	195.12	100.54	30.39	313.5	274.0	439.2	12.8	119.3	2.6
500	23.425	215.51	101.01	41.85	1539.9	969.0	1572.7	58.7	-99.1	119.4
600	28.960	301.48	100.52	41.99	2399.0	961.5	2798.6	37.4	336.5	67.2
700	19.590	216.41	100.75	27.81	1670.6	535.0	1462.6	63.7	5.5	77.3
800	4.170	255.65	103.12	26.15	772.4	147.5	707.0	-39.3	31.9	27.0
900	32.305	298.94	100.20	28.03	2524.2	533.5	2366.2	69.8	-9.5	59.1
FAN	815.930	256.00	101.00	56.05	406472.5	464411.5	625290.0			
DOORS	86.005	255.76	110.49	60.90	18165.1	18193.2	35922.0	52.7	-0.8	115.5
TOTAL	1350.885	257.69	101.95	62.82	1,049,851	1210,756	4978,703	-1567	121,196	10,293

*See Fig. 7

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MOMENTS OF INERTIA - WING AND CONTENTS - EXCLUDING FLAP AND AILERON

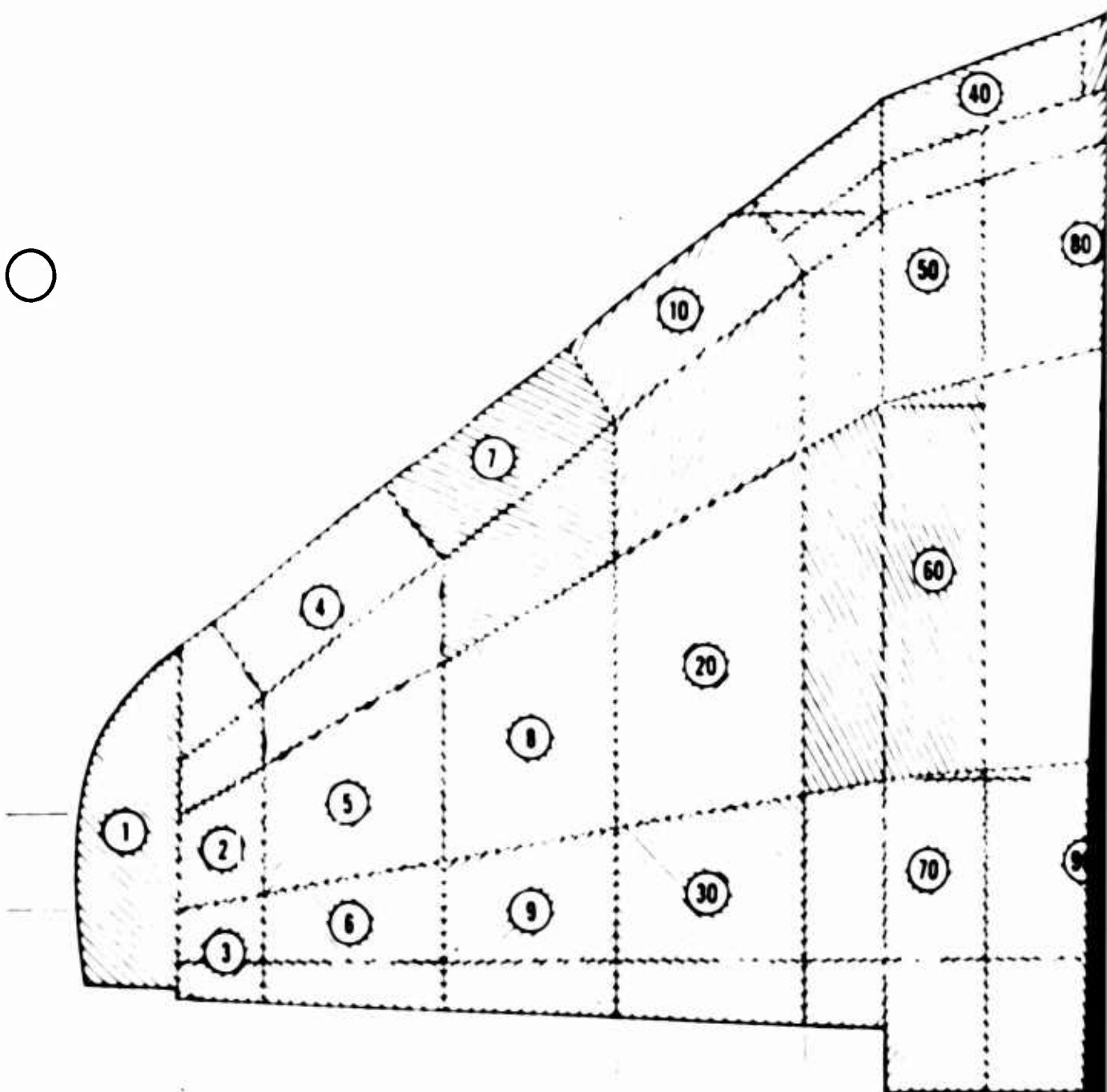
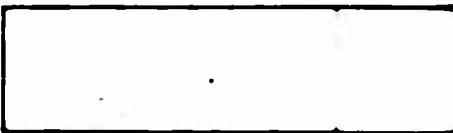
WING AND CONTENTS - EXCLUDING FLAP AND AILERON

DATA SHOWN FOR 1/2 WING

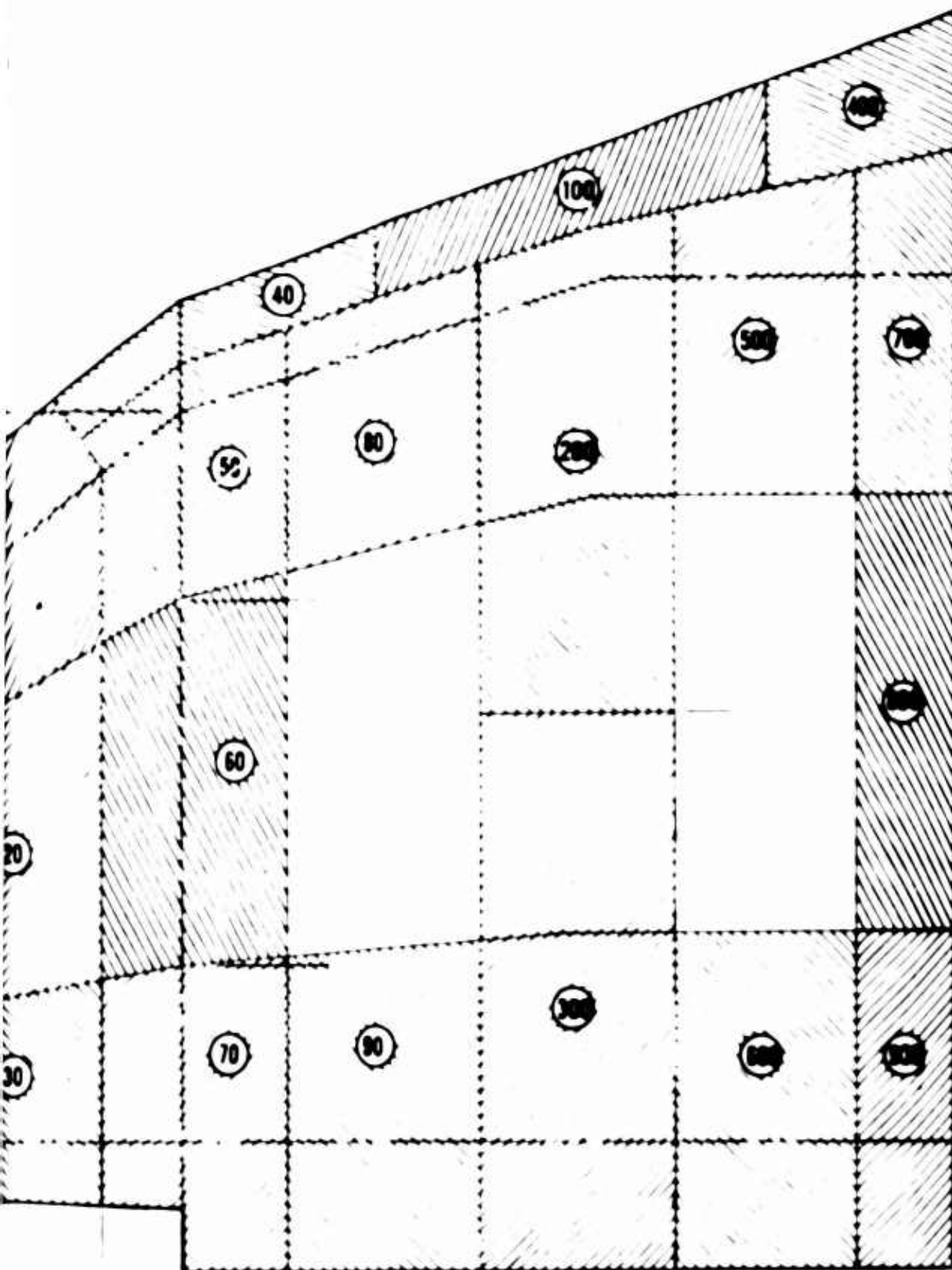
LIPT PAN AND MOVEABLE PORTION OF PAN DOORS ARE TREATED AS SEPARATE UNITS

WEIGHT PANEL NUMBER	WEIGHT POUNDS	\bar{X} HORIZ. C.G. FUS. STA	\bar{Z} VERT. C.G. WATERLINE	\bar{Y} SPAN C.G. BUTTOCK LINE	I_y PITCH LB. IN ²	I_x ROLL LB. IN ²	I_z YAW LB. IN ²	I_{xz} PRODUCT LB. IN ²	I_{xy} PRODUCT LB. IN ²	I_{yz} PRODUCT LB. IN ²
1	7.975	273.89	104.41	168.66	1963.2	111.8	2007.8	155.3	52.1	48.7
2	1.610	285.69	105.19	165.54	30.3	33.7	34.6	-0.4	7.4	11.3
3	1.765	295.73	105.44	165.22	17.8	23.4	24.0	1.2	0.3	11.6
4	4.190	264.55	103.96	152.69	92.4	152.4	174.6	-1.3	-9.8	40.8
5	2.680	282.01	104.45	152.00	102.9	102.2	99.6	0.1	0	59.7
5	3.350	295.31	104.96	151.59	59.7	91.8	88.3	1.2	-1.7	41.5
7	6.325	252.83	103.31	135.84	265.6	278.7	401.9	10.8	39.8	68.4
8	5.130	274.06	103.74	135.96	330.6	283.1	295.3	0	19.7	131.5
9	6.655	293.78	102.79	133.70	195.0	246.1	254.6	-1.5	-14.5	104.0
10	12.065	239.84	101.91	117.15	679.2	521.3	806.1	21.3	147.8	157.4
20	10.615	268.63	101.50	119.36	879.8	517.7	763.7	-7.9	32.0	317.2
30	18.280	294.46	101.98	120.99	1611.7	630.1	1839.6	17.5	82.5	207.1
40	4.820	219.36	101.58	98.34	119.5	387.7	473.4	-2.5	151.0	3.5
50	25.145	230.50	100.88	100.47	1187.1	1123.5	1369.1	-51.6	193.7	281.9
60	18.390	262.19	101.42	101.14	1467.6	701.3	1343.2	-5.1	67.2	369.5
70	23.550	293.60	100.18	101.37	2129.0	1176.3	2394.5	-126.9	-385.5	354.0
80	18.505	221.79	100.53	80.76	1141.3	864.3	1405.3	-76.9	158.0	87.6
90	18.325	294.87	100.83	81.49	983.9	689.7	1135.9	85.0	-87.0	124.0
100	14.390	205.68	101.08	60.72	211.2	1128.4	1201.9	-9.8	76.4	22.9
200	59.960	229.03	104.55	59.34	23084.4	9562.2	27679.8	218.6	-2285.4	1239.7
300	52.145	284.14	104.59	60.45	18529.8	3580.5	17826.3	-307.0	-441.0	1193.0
400	7.865	195.12	100.54	30.39	313.5	274.0	439.2	12.8	119.3	2.6
500	23.425	215.51	101.01	41.85	1539.9	969.0	1572.7	58.7	-99.1	119.4
600	20.940	297.19	100.70	41.54	918.6	880.4	1251.3	73.0	188.0	71.0
700	19.590	216.41	100.75	27.81	1670.6	535.0	1462.6	63.7	5.5	77.3
800	4.170	255.65	103.12	26.15	772.4	147.5	707.0	-39.3	31.9	27.0
900	24.465	295.43	100.31	28.13	1178.5	493.3	1011.1	100.0	21.0	57.0
PAN	815.930	256.00	101.00	56.05	406472.5	464411.5	625290.0			
DOORS	86.005	255.76	110.49	60.90	18165.1	18193.2	35922.0	52.7	-0.8	115.5
TOTAL	1318.265	256.34	102.00	62.97	950,685	1,190,771	1,859,885	1979.5	131,983	9838

See Fig.



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AILERON AND FLIGHT TAB MASS PROPERTIES AND MOMENTS OF INERTIA

DATA FOR ONE SIDE ONLY

PANEL BOUNDARIES ARE BUTTOK LINES PARALLEL TO CENTER LINE OF AIRPLANE

PANEL NO. *	PANEL BOUNDARIES BUTT. LINE	WEIGHT POUNDS	\bar{X} PANEL C.G. FJS. STA.	\bar{Z} PANEL C.G. WATERLINE	\bar{Y} SPAN C.G. BUTT. LINE	I_y PITCH IN^2	I_x ROLL IN^2	I_z YAW IN^2	I_{xz} PRODUCT IN^2	I_{xy} PRODUCT IN^2	I_{yz} PRODUCT IN^2
AILERON WITH FLIGHT TAB AND BALANCE WEIGHTS											
101	102-116.3	5.850	312.27	101.52	108.24	302.7	74.0	355.4	- 13.8	- 11.1	11.4
102	116.3-130.3	11.995	311.14	102.59	124.39	512.6	84.5	558.3	- 30.5	- 17.8	23.6
103	130.3-144.3	2.590	306.44	103.62	136.89	111.9	52.6	141.3	- 0.5	- 0.2	15.4
104	144.3-158.3	2.085	306.25	104.60	151.59	90.0	34.9	105.2	- 0.4	- 0.5	14.3
105	158.3-169.3	2.525	305.81	105.17	165.84	73.0	37.6	91.2	- 1.6	- 1.1	15.3
106	169.3-Tip	.995	306.74	105.82	172.79	29.4	6.7	31.2	- 0.4	- 0.9	1.1
TOTAL		26.040	309.85	102.99	130.05	1323.0	9637.3	10750.9	- 122.1	- 1124.5	129.9
AILERON LESS FLIGHT TAB AND BALANCE WEIGHTS											
101	102-116.3	3.470	307.67	101.83	107.67	115.0	57.8	153.4	- 2.2	- 6.3	10.3
102	116.3-130.3	7.820	307.34	102.88	124.71	179.3	54.4	199.1	- 5.4	- 6.3	20.9
103	130.3-144.3	2.590	306.44	103.62	136.89	111.9	52.7	141.3	- 0.5	- 0.2	15.4
104	144.3-158.3	2.085	306.25	104.60	151.59	90.0	34.9	105.2	- 0.4	- 0.5	14.3
105	158.3-169.3	2.525	305.81	105.17	165.84	73.0	37.6	91.2	- 1.6	- 1.1	15.3
106	169.3-Tip	.995	306.74	105.82	172.79	29.4	6.7	31.2	- 0.4	- 0.9	1.1
TOTAL		19.485	306.93	103.42	133.96	634.1	8074.2	8532.0	- 22.8	- 224.8	111.8
AILERON FLIGHT TAB WITH BALANCE WEIGHTS											
101	102-116.3	2.380	318.98	101.08	109.07	6.4	12.7	18.7	- 0.3	- 4.8	.2
102	116.3-Tip	4.175	318.28	102.04	123.80	5.6	25.8	31.0	- 0.1	- 3.1	.3
TOTAL		6.555	318.53	101.69	118.45	14.1	368.9	379.5	- 0.6	- 17.5	2.1
FLIGHT TAB BALANCE WEIGHTS											
101	102-116.3	1.39	317.8	101.0	110.0						
102	116.3-Tip	1.11	316.7	102.0	121.8						
TOTAL		2.50	317.3	101.5	115.2						

* See Fig. 8

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AILERON
MASS PANELS

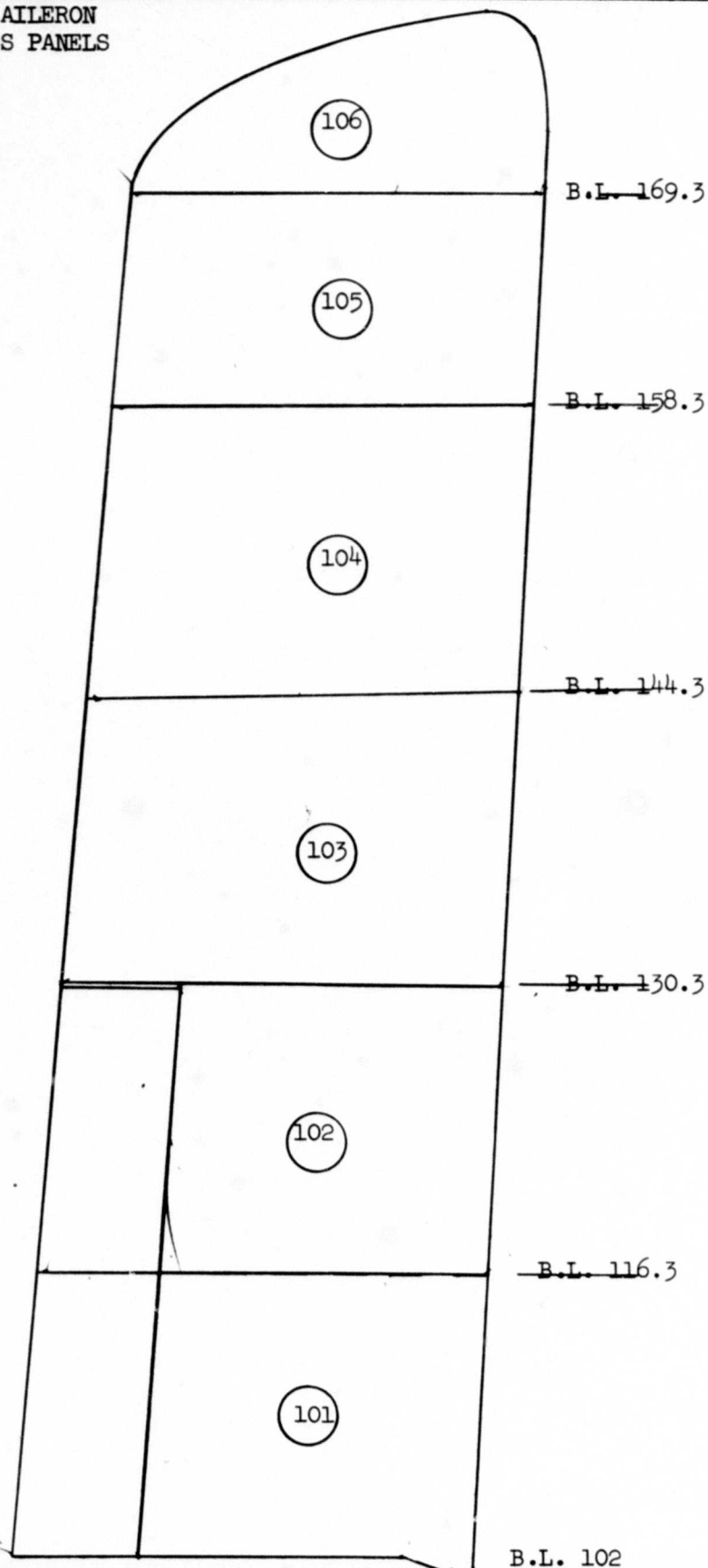


Fig. 8

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MOMENTS OF INERTIA - FLAP

MOMENTS OF INERTIA - FLAP

DATA SHOWN FOR ONE SIDE

WEIGHT PANEL NUMBER *	WEIGHT POUNDS	\bar{X} HORIZ. C.G. FUS. STA	\bar{Z} VERT. C.G. WATERLINE	\bar{Y} SPAN C.G. BUTTOCK LINE	I_y PITCH LB. IN ²	I_x ROLL LB. IN ²	I_z YAW LB. IN ²	I_{xz} PRODUCT LB. IN ²	I_{xy} PRODUCT LB. IN ²	I_{yz} PRODUCT LB. IN ²
70	4.025	312.04	99.57	97.08	55.3	26.6	75.8	4.8	-19.8	2.9
90	5.955	312.71	100.08	81.02	66.1	61.3	119.3	1.1	1.3	3.3
300	6.780	312.91	100.04	60.65	89.9	146.4	222.9	4.0	-22.4	4.1
600	8.020	312.70	100.06	43.17	82.5	63.4	136.4	2.1	0.2	2.0
900	7.840	309.92	99.87	27.70	90.6	37.9	107.0	8.9	13.5	3.0
TOTAL	32.620	312.00	99.95	56.65	431.8	18587.5	18959.1	23.8	504.5	17.1

* See Fig. 7

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FLAP
MASS PANELS

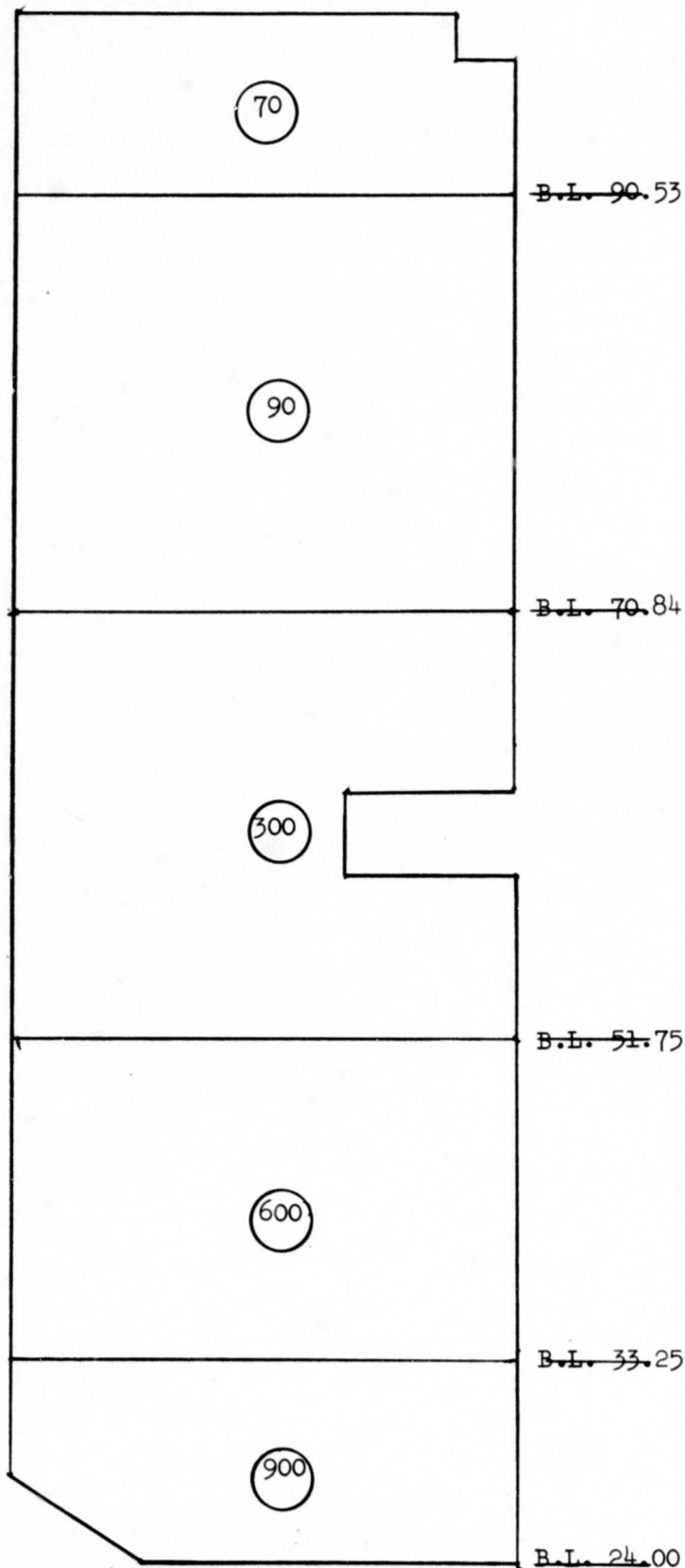


Fig. 9

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3.4 HORIZONTAL TAIL MOMENT OF INERTIA

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HORIZONTAL STABILIZER AND ELEVATOR MASS DISTRIBUTION AND MOMENTS OF INERTIA

HORIZONTAL STABILIZER AND ELEVATOR MASS DISTRIBUTION AND MOMENTS OF INERTIA

DATA FOR ONE SIDE ONLY

PANEL NO. *	PANEL BOUNDARIES BUTTOK LINE	WEIGHT ONE SIDE POUNDS	PANEL C.G. FUS STA	PANEL C.G. BUTT. LINE	PANEL C.G. WATER LINE	I _y PITCH LB. IN ²	I _x ROLL LB. IN ²	I _z YAW LB. IN ²	I _{xz} PRODUCT LB. IN ²	I _{xy} PRODUCT LB. IN ²	I _{yz} PRODUCT LB. IN ²
HORIZONTAL STABILIZER (EXCLUDING ELEVATOR)											
101	0-6.51	9.375	499.95	2.36	204.43	2006.5	259.0	2042.4	-7.6	-36.8	1.1
102	6.51-13.21	3.650	495.72	10.00	205.85	524.9	23.1	514.6	-2.3	0	0.6
103	13.21-19.91	3.385	496.57	17.00	206.00	454.3	23.2	443.2	.5	0	1.1
104	19.91-26.61	3.175	497.43	23.00	205.99	408.5	22.2	397.7	.1	0	1.4
105	26.61-33.31	3.230	498.00	30.05	206.00	359.0	21.0	351.5	.1	0	0
106	33.31-40.01	2.935	503.29	36.94	206.00	294.2	11.3	294.1	.1	.7	.8
107	40.01-46.71	2.195	502.22	43.00	206.00	184.9	10.7	183.5	0	0	.9
108	46.71-53.41	2.065	503.04	50.00	206.00	157.6	9.8	156.7	0	0	.9
109	53.41-60.11	1.875	503.90	57.00	206.00	128.1	8.9	127.4	0	0	1.1
110	60.11-66.81	1.770	504.89	63.03	206.01	106.3	8.0	106.0	.1	- .1	1.1
120	66.81-79.10	3.940	509.66	71.62	206.00	287.8	33.5	300.4	0	8.0	.5
TOTAL STAB.		37.595	500.87	29.07	205.59	5542.0	21224.8	26307.5	6.7	2859.8	26.1
ELEVATOR											
101	0-6.51	2.170	517.76	3.79	205.92	24.6	11.9	35.4	0	-1.7	0
102	6.51-13.21	3.265	517.12	9.56	206.00	59.6	11.4	69.4	0	3.5	0
103	13.21-19.91	1.875	517.53	17.00	206.00	46.3	6.8	51.8	0	0	0
104	19.91-26.61	1.765	517.51	23.38	206.00	40.6	7.0	46.4	0	-1.0	0
105	26.61-33.31	1.730	517.52	30.00	206.00	35.9	6.3	41.1	0	0	0.1
106	33.31-40.01	2.170	517.71	37.02	206.12	32.3	6.0	36.4	-0.1	-0.1	0.2
107	40.01-46.71	1.720	517.38	43.23	206.00	28.4	6.0	33.4	0	-0.8	0.1
108	46.71-53.41	1.595	517.51	50.00	206.00	24.5	5.7	29.3	0	0	0.1

* See Fig. 10

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HORIZONTAL STABILIZER AND ELEVATOR MASS DISTRIBUTION AND MOMENTS OF INERTIA

HORIZONTAL STABILIZER AND ELEVATOR MASS DISTRIBUTION AND MOMENTS OF INERTIA

DATA FOR ONE SIDE ONLY

PANEL BOUNDARIES ARE BUTTOCK LINES PARALLEL TO CENTER LINE OF AIRPLANE

PANEL NO. *	PANEL BOUNDARIES BUTTOCK LINE	WEIGHT ONE SIDE POUNDS	X PANEL C.G. FUS STA	Y PANEL C.G. BUTT. LINE	Z PANEL C.G. WATER LINE	I _y PITCH LB. IN ²	I _x ROLL LB. IN ²	I _z YAW LB. IN ²	I _{xz} PRODUCT LB. IN ²	I _{xy} PRODUCT LB. IN ²	I _{yz} PRODUCT LB. IN ²
ELEVATOR (Continued)											
109	53.41-60.11	1.550	517.47	56.95	206.00	21.7	5.7	26.5	0	-0.3	0.1
110	60.11-66.81	1.530	517.48	63.00	206.00	18.8	5.5	23.5	0	0	0.1
120	66.81-69.91	0.980	517.88	66.66	206.00	8.6	1.4	9.6	0	0.2	0.1
TOTAL		20.350	517.50	31.98	206.00	342.3	8545.1	8875.0	-0.1	22.66	0.7
STABILIZER AND ELEVATOR											
101	0-651	11.545	503.30	2.63	204.71	2593.9	278.4	2640.4	38.9	6.4	1.3
102	6.51-13.21	6.915	505.83	9.79	205.92	1373.2	34.9	1373.0	3.2	-12.7	0.6
103	13.21-19.91	5.260	504.04	17.00	206.00	1030.6	30.0	1025.0	0.4	0	1.2
104	19.91-26.61	4.940	504.61	23.14	205.99	906.6	29.4	901.8	0.2	7.6	1.1
105	26.61-33.31	4.960	504.81	30.03	206.00	824.3	27.3	822.0	-0.1	0.7	1.7
106	33.31-40.01	5.105	509.42	36.98	206.05	586.0	17.3	590.0	1.9	2.0	0.9
107	40.01-46.71	3.915	508.88	43.10	206.00	434.8	16.8	438.6	0	2.5	0.9
108	46.71-53.41	3.660	509.35	50.00	206.00	370.5	15.5	374.4	0.1	0	1.0
109	53.41-60.11	3.425	510.04	56.98	206.00	306.1	14.6	310.1	0	-0.9	1.1
110	60.11-66.81	3.300	510.73	63.02	206.00	255.2	13.5	259.5	0	-0.4	1.2
120	66.81-79.10	4.920	511.30	71.03	206.00	349.4	41.8	369.9	0	-10.9	0.6
TOTAL		57.945	506.71	30.09	205.74	9538.8	29884.0	38947.0	96.6	3521.9	27.9

* See Fig. 10

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HORIZONTAL STABILIZER AND ELEVATOR MASS
DISTRIBUTION

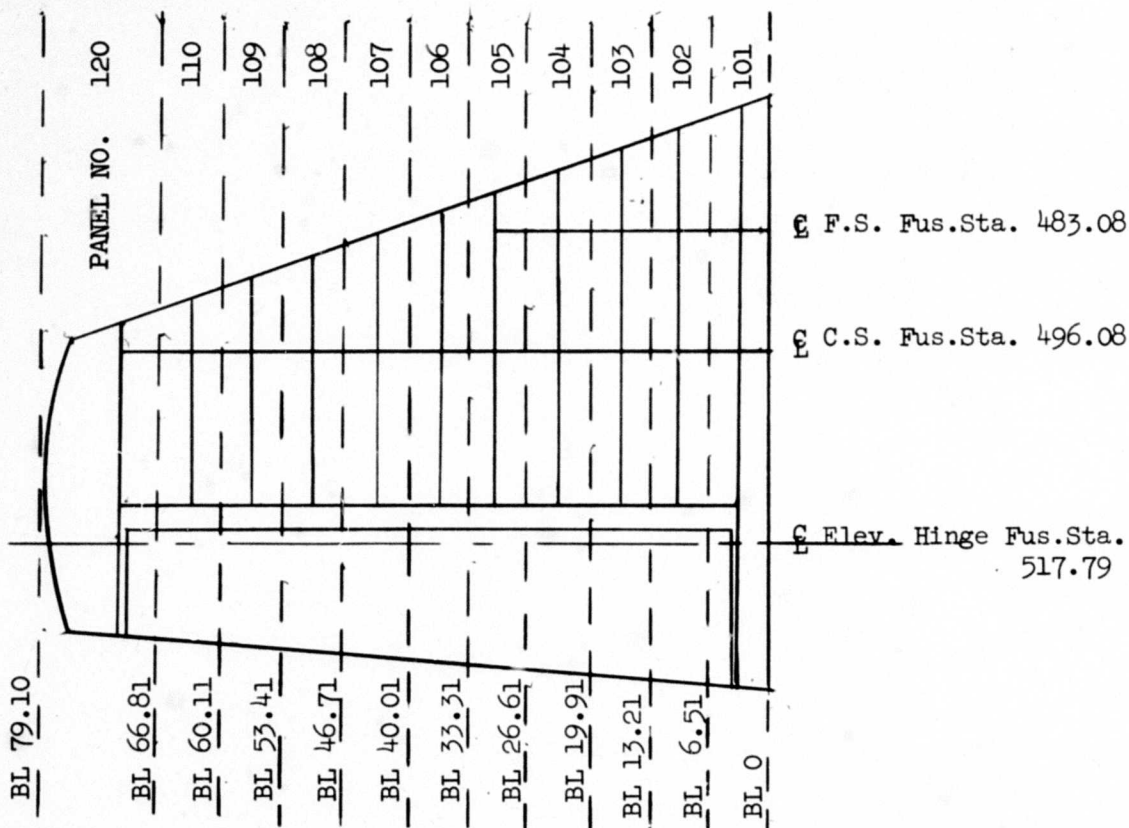
HORIZONTAL STABILIZER AND ELEVATOR MASS DISTRIBUTION
DATA FOR ONE SIDE ONLY
PANEL BOUNDARIES ARE BUTTOCK LINES PARALLEL TO CENTER LINE OF AIRPLANE

PANEL NO. *	PANEL BOUNDARIES BUTTOCK LINE	WEIGHT ONE SIDE POUNDS	\bar{X} FUS. STA.	\bar{Y} BUTT. LINE	\bar{Z} WATER LINE
BALANCE WEIGHTS					
101	0-6.51	.465	514.4	6.0	206.0
102	6.51-13.21	1.430	514.4	9.3	206.0
103	13.21-19.91	.870	514.6	17.0	206.0
104	19.91-26.61	.810	514.7	23.7	206.0
105	26.61-33.31	.805	514.9	30.0	206.0
106	33.31-40.01	.680	515.0	37.0	206.0
107	40.01-46.71	.780	515.1	43.5	206.0
108	46.71-53.41	.675	515.3	50.0	206.0
109	53.41-60.11	.675	515.4	57.0	206.0
110	60.11-66.81	.670	515.6	63.0	206.0
120	66.81-69.91	.250	515.7	68.0	206.0
TOTAL		8.160	514.9	32.5	206.0

* SEE FIG. 10

HORIZONTAL STABILIZER

MASS PANELS



SYMBOL	DEFINITION
\bar{X}	HORIZONTAL CENTER OF GRAVITY OF ITEM
\bar{Y}	SPANWISE CENTER OF GRAVITY OF ITEM
\bar{Z}	VERTICAL CENTER OF GRAVITY OF ITEM
I_x	MOMENT OF INERTIA ABOUT HORIZONTAL AXIS WITH RESPECT TO ITEM CENTER OF GRAVITY
I_y	MOMENT OF INERTIA ABOUT SPANWISE AXIS WITH RESPECT TO ITEM CENTER OF GRAVITY
I_z	MOMENT OF INERTIA ABOUT VERTICAL AXIS WITH RESPECT TO ITEM CENTER OF GRAVITY
I_{xz}	PRODUCT OF INERTIA IN HORIZONTAL-VERTICAL PLANE WITH RESPECT TO ITEM CENTER OF GRAVITY
I_{xy}	PRODUCT OF INERTIA IN HORIZONTAL-SPANWISE PLANE WITH RESPECT TO ITEM CENTER OF GRAVITY
I_{yz}	PRODUCT OF INERTIA IN SPANWISE-VERTICAL PLANE WITH RESPECT TO ITEM CENTER OF GRAVITY

Fig. 10

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PAG# 183

3.5 Vertical Tail Moment of Inertia

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VERTICAL STABILIZER AND RUDDER MASS DISTRIBUTION
AND MOMENTS OF INERTIA

VERTICAL STABILIZER AND RUDDER MASS DISTRIBUTION AND MOMENTS OF INERTIA-PANEL BOUNDARIES
ARE VERTICAL STABILIZER STATIONS PERPENDICULAR TO RUDDER HINGE LINE

PANEL NO.*	PANEL BOUNDARIES STAB. STA.	WEIGHT POUNDS	PANEL C.G. FUS. STA.	\bar{X}	PANEL C.G. WATERLINE	\bar{Z}	I_y PITCH LB. IN ²	I_x ROLL LB. IN ²	I_z YAW LB. IN ²	I_{xz} PRODUCT LB. IN ²
RUDDER INCLUDING BALANCE WEIGHTS										
101	0-16.8	13.83	495.31		122.45		704.2	372.6	390.6	- 94.5
102	16.8-23.6	4.48	499.09		132.50		222.0	27.0	207.8	- 39.1
103	23.6-30.4	3.25	500.38		139.43		145.1	25.3	129.8	- 33.6
104	30.4-37.2	3.48	503.54		145.82		199.2	25.8	182.7	- 40.4
105	37.2-44.0	2.99	502.61		152.42		74.4	16.1	67.5	- 10.5
106	44.0-50.8	2.67	504.69		158.98		65.2	11.0	60.7	- 6.0
107	50.8-57.6	1.77	508.04		165.18		48.1	9.3	45.3	- 6.1
108	57.6-64.4	1.70	509.82		172.22		41.7	9.1	38.7	- 5.3
109	64.4-70.3	1.32	511.28		178.11		28.1	6.3	26.7	- 4.6
110	70.3-72.05	0.95	513.03		181.61		9.4	1.1	9.7	- 1.2
TOTAL		36.44	500.63		140.52		15056.1	12997.9	2184.3	3301.2
STABILIZER AND RUDDER										
101	0-16.8	26.90	481.68		127.27		11287.8	1681.2	9998.7	-3020.8
102	16.8-23.6	12.17	478.37		138.15		5796.6	541.8	5537.7	-1340.7
103	23.6-30.4	10.85	478.81		145.29		4642.9	441.5	4440.7	-1061.6
104	30.4-37.2	13.45	476.01		152.95		6475.5	551.2	6144.1	-1515.7
105	37.2-44.0	10.78	482.78		158.32		3771.0	391.6	3586.1	- 806.8
106	44.0-50.8	8.91	485.69		164.08		2852.3	274.7	2756.9	- 612.9
107	50.8-57.6	8.56	486.99		171.08		2431.6	235.4	2328.8	- 526.7
108	57.6-64.4	8.33	489.05		177.35		2129.8	199.2	2054.5	- 442.2
109	64.4-70.3	9.70	489.44		184.18		2158.1	201.2	2084.6	- 435.7
110	70.3-75.1	13.38	493.63		188.00		2876.3	253.5	2741.8	- 626.8
120	75.1-TOP	31.14	492.59		196.52		4524.5	459.0	4215.2	- 832.7
TOTAL		154.17	485.45		163.91		151166.0	101936.5	51402.5	8780.6

* See Fig. 11

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VERTICAL STABILIZER AND RUDDER MASS DISTRIBUTION
AND MOMENTS OF INERTIAVERTICAL STABILIZER AND RUDDER MASS DISTRIBUTION AND MOMENTS OF INERTIA-PANEL BOUNDARIES
ARE VERTICAL STABILIZER STATIONS PERPENDICULAR TO RUDDER HINGE LINE

PANEL NO.*	PANEL BOUNDARIES STAB. STA.	WEIGHT POUNDS	\bar{X} PANEL C.G. FUS. STA.	\bar{Z} PANEL C.G. WATERLINE	I_y PITCH $LB. IN^2$	I_x ROLL $LB. IN^2$	I_z YAW $LB. IN^2$	I_{xz} PRODUCT $LB. IN^2$	
VERTICAL STABILIZER (EXCLUDING RUDDER)									
101	0-16.8	13.07	467.26	132.37	4634.8	646.3	4321.4	- 1055.2	
102	16.8-23.6	7.69	466.29	141.44	2303.6	288.6	2285.0	- 471.7	
103	23.6-30.4	7.60	469.59	147.80	2179.7	256.7	2152.2	- 441.3	
104	30.4-37.2	9.97	466.40	155.44	2478.8	286.4	2402.9	- 553.3	
105	37.2-44.0	7.79	475.17	160.59	1925.3	231.4	1891.3	- 312.0	
106	44.0-50.8	6.24	477.56	166.26	1311.7	164.7	1319.8	- 237.7	
107	50.8-57.6	6.79	481.50	172.61	1316.8	148.4	1294.6	- 243.6	
108	57.6-64.4	6.63	483.73	178.66	1110.6	133.7	1094.6	- 209.1	
109	64.4-70.3	8.38	486.00	185.14	1344.7	138.7	1328.8	- 228.6	
110	70.3-75.1	12.43	492.15	188.48	2440.4	210.6	2347.3	- 499.0	
120	75.1-TOP	31.14	492.59	196.52	4524.5	459.0	4215.2	- 832.7	
TOTAL		117.73	480.75	171.15	99005.3	62830.9	38221.3	22423.8	

* See Fig. 11

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VERTICAL STABILIZER AND RUDDER MASS DISTRIBUTION
PANEL BOUNDARIES ARE VERTICAL STABILIZER
STATIONS PERPENDICULAR TO RUDDER HINGE LINE

PANEL NO.*	PANEL BOUNDARIES STAB. STA.	WEIGHT POUNDS	\bar{X} PANEL C.G. FUS. STA.	\bar{Z} PANEL C.G. WATERLINE
BALANCE WEIGHTS				
101	0-16.8	1.87	492.0	129.0
102	16.8-23.6	1.88	493.5	133.4
103	23.6-30.4	1.49	495.8	141.0
104	30.4-37.2	1.56	497.9	147.4
105	37.2-44.0	1.66	499.9	153.0
106	44.0-50.8	1.41	501.8	159.2
107	50.8-57.6	.52	503.9	166.0
108	57.6-64.4	.52	506.0	173.0
109	64.4-70.3	.45	508.1	179.0
110	70.3-72.05	.11	509.1	182.0
TOTAL		11.47	497.8	147.3

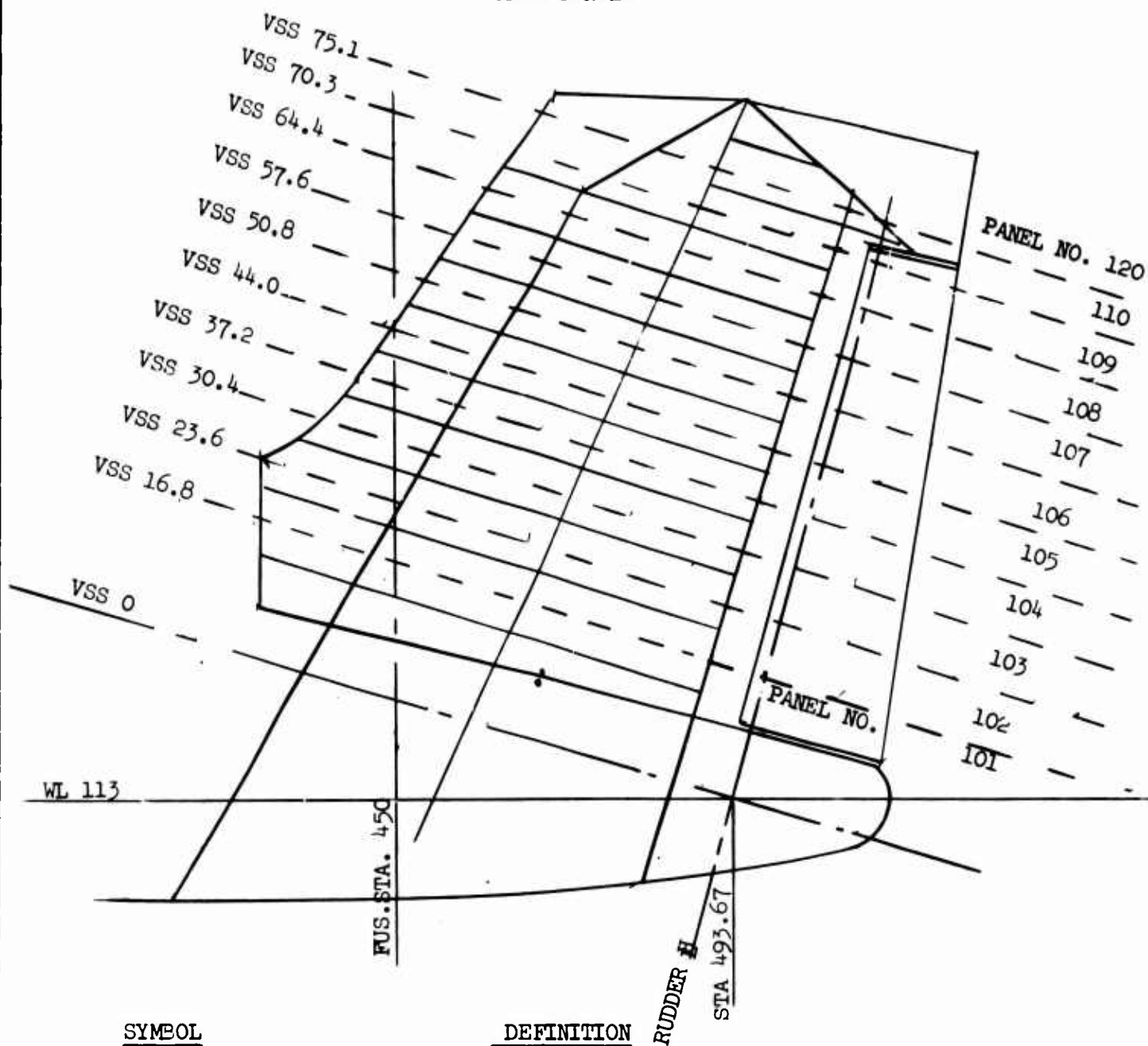
* See Fig. 11

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VERTICAL STABILIZER
MASS PANELS



SYMBOL

DEFINITION

\bar{X}	Horizontal center of gravity of item (fuselage station).
\bar{Y}	Longitudinal c.g. of item. Assumed to be Buttock Line Zero.
\bar{Z}	Vertical Center of gravity of item (Water Line).
I_x	Moment of inertia about horizontal axis with respect to item c.g.
I_y	Moment of inertia about spanwise axis with respect to item c.g.
I_z	Moment of inertia about vertical axis with respect to item c.g.
I_{xz}	Product of inertia in horizontal-vertical plane with respect to item c.g.

Fig. 11

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3.6 Instrumentation Moment of Inertia

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INSTRUMENTATION MOMENTS OF INERTIA

INSTRUMENTATION MOMENTS OF INERTIA

BREAKDOWN BY AREA	WEIGHT POUNDS	\bar{X} FUS. STA.	\bar{Z} WATER- LINE	\bar{Y} BUTTOCK LINE	I_x ROLL LB. IN ²	I_y PITCH LB. IN ²	I_z YAW LB. IN ²
Wing	28.41	250.27	100.90	70.65	25,144	14,698	39,752
Fuselage	458.11	147.88	101.76	0	124,314	2,490,045	2,546,841
Horiz. Stab.	1.88	498.50	194.13	35.26	3,257	1,918	1,553
Vert. Stab.	3.15	479.16	159.38	0	2,095	2,793	701
Aileron	.07	317.70	102.00	126.00	0	0	0
Rudder	.16	493.06	115.00	0	1	1	2
Total Instru.	491.78	157.41	102.44	0	326,395	3,386,973	3,585,300
TOTAL INSTRU. MINUS PHOTO RECORDER, ACCELEROMETER INSTL. AND 2nd TELEMETRY PKG.							
Std. Config.	404.22	160.04	102.37	0	310,710	2,617,941	2,813,730

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4.0 SUPPLEMENTARY DATA

4.1 Component Weight Distribution

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COMPONENT WEIGHT DISTRIBUTION

The weight empty of this aircraft is comprised of the following:

Ryan fabricated parts	3289.99 lbs.
General Electric furnished components (including ejection seat)	2792.28 lbs.
Purchased Parts	1235.18 lbs.
Standard Parts (AN, NAS and MS)	209.49 lbs.

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4.2 Material Breakdown

RYAN

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SUMMARY OF RYAN FABRICATED PARTS

	WEIGHT	* NO. OF PARTS
Aluminum	(1791.31)	(5320)
Sheet	960.11	3915
Extrusion	46.45	205
Chem-Milled	132.50	41
Honeycomb	32.75	14
Machined	544.07	534
Tubing		
Hydraulic	42.03	440
Other	33.40	171
Magnesium	(224.75)	(327)
Sheet	147.43	193
Machined	23.53	102
Chem-Milled	53.79	32
Steel	(508.73)	(1006)
Sheet	309.83	518
Machined	106.39	297
Tubing	83.38	166
Wire	2.27	20
Control Cable	6.86	5
Titanium	(295.34)	(648)
Sheet	240.22	559
Machined	16.27	78
Chem-Milled	38.85	11
Fiberglass	219.36	175
Plastic	1.83	21
Rubber	9.66	51
Corefill	1.35	1
Finish Paint	11.25	
Min-K Insulation	35.99	38
Teflon	1.71	16
Copper Wire	96.88	
Copper Bar	.11	2
Fabric	1.02	8
Hydraulic Fluid	31.62	
Brass	.88	9

RYAN

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SUMMARY OF RYAN FABRICATED PARTS (Continued)

	WEIGHT	* NO. OF PARTS
Foam	3.39	6
Neoprene	.96	8
Tungston	31.37	11
Superoilite	.74	6
Adhesive	11.62	
TOTAL	3289.99	7653

* NOTE: "Part" means one particular design
(I.E. There may be many "pieces" of one "part")
Left and right hand items are treated as separate parts.

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4.3 Weighing Procedure

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WEIGHING PROCEDURE

1. PRE-WEIGHING INVENTORY

- A. Fwd and Aft Main Fuel tanks will be drained through sumps until only trapped fuel remains. Airplane is in level position for this operation.
- B. Engine oil tanks are serviced to the prescribed four quart level per tank.
- C. Hydraulic reservoirs should be serviced to the operational level.
- D. A wet battery installed.
- E. All access panels, canopies, etc. will be in place with full complement of fasteners.
- F. A visual count of all flight test equipment will be made to determine exact weight of configuration being used.
- G. A similar check will be made to assure that all basic airplane equipment is aboard.
- H. All control surfaces will be in a faired position and all louvers shut.
- I. A list will be made of ground locks, jack fittings, wheel chocks and any other tare item to be deducted from the scale weight.

2. POSITIONING AIRCRAFT ON SCALES

- A. When the portable platform type scales are used, it is recommended that the aircraft be towed until main gear wheels are each positioned on scales. Then jack airplane at the wing and tail positions until a scale can be rolled in from the side under the nose wheel. This is required because of limited clearance between the bottom of nose fuselage and high point of scale.
- B. The left or right hand main landing gear door sill - 143F060 at fuselage station 287 to 365, waterline 93.25 and buttock line 24 - may be used as reference plane to level aircraft.

3. REFERENCE MEASUREMENTS

After measuring oleo extensions, the corresponding fuselage stations for the centerline points of the nose and main gear axles may be obtained from the tables on the next page. For an actual verification of this wheel base dimension the following procedure should be employed. Connect the main gear jacking lugs with a taut wire and measure the distance from the nose axle centerline along a line perpendicular to the wire. Because the lugs are offset from the main gear axle centerlines, an increment of .17 inches must be added in the C.T.O.L. position and .30 inches subtracted in the V.T.O.L. position.

Should electronic weighing cells be used, the wing jacking points are at fuselage station 226.5 and the tail jack is at 384.3.

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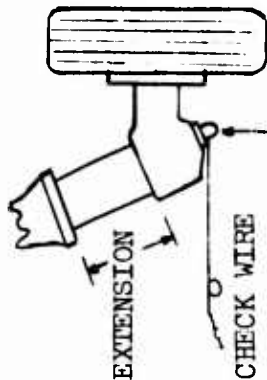
V.T.O.L. MAIN L.G. EXT.
VS.
FUS. STA. AT OF AXLE

INCH	FUS. STA.
0	295.32
1	295.57
2	295.81
3	296.05
4	296.29
5	296.53
6	296.78
7	297.02
8	297.26
9	297.51

COMPR.

STATIC

EXTEN.



C.T.O.L. MAIN L.G. EXT.
VS.
FUS. STA. AT OF AXLE

INCH	FUS. STA.
0	376.38
1	276.26
2	276.14
3	276.02
4	275.90
5	275.78
6	275.66
7	275.53
8	275.41
9	275.29

COMPR.

STATIC

EXTEN.

NOSE GEAR EXTENSION
VS.
FUS. STA. AT OF AXLE

INCH	FUS. STA.
0	136.11
1	136.02
2	135.93
3	135.85
4	135.76
5	135.67
5.3	135.61
6	135.59
7	135.50
8	135.41

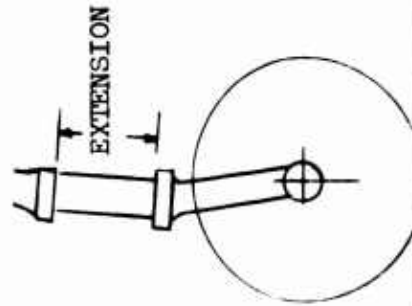
COMPR.

STATIC

EXTEN.

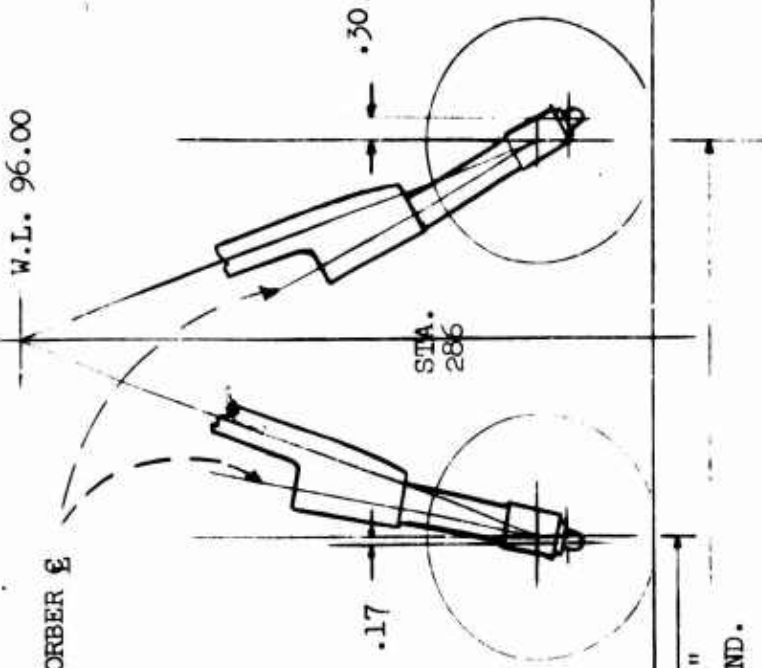
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SHOCK ABSORBER

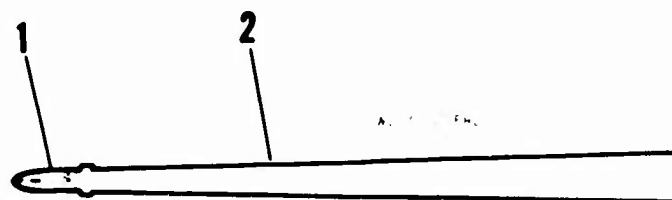


C.T.O.L.
STATIC COND.
140.4"

160.4"
STATIC COND.
V.T.O.L.

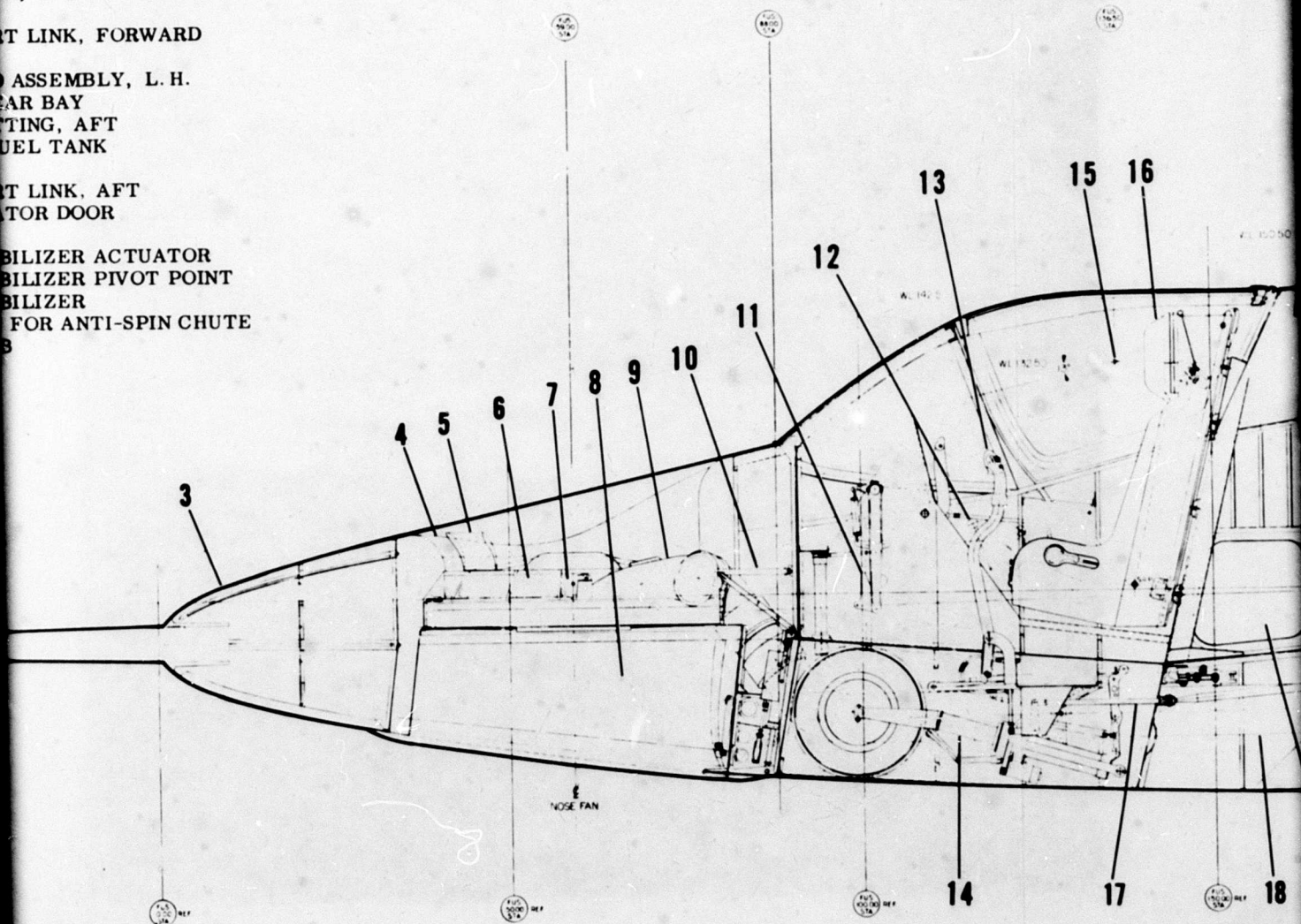


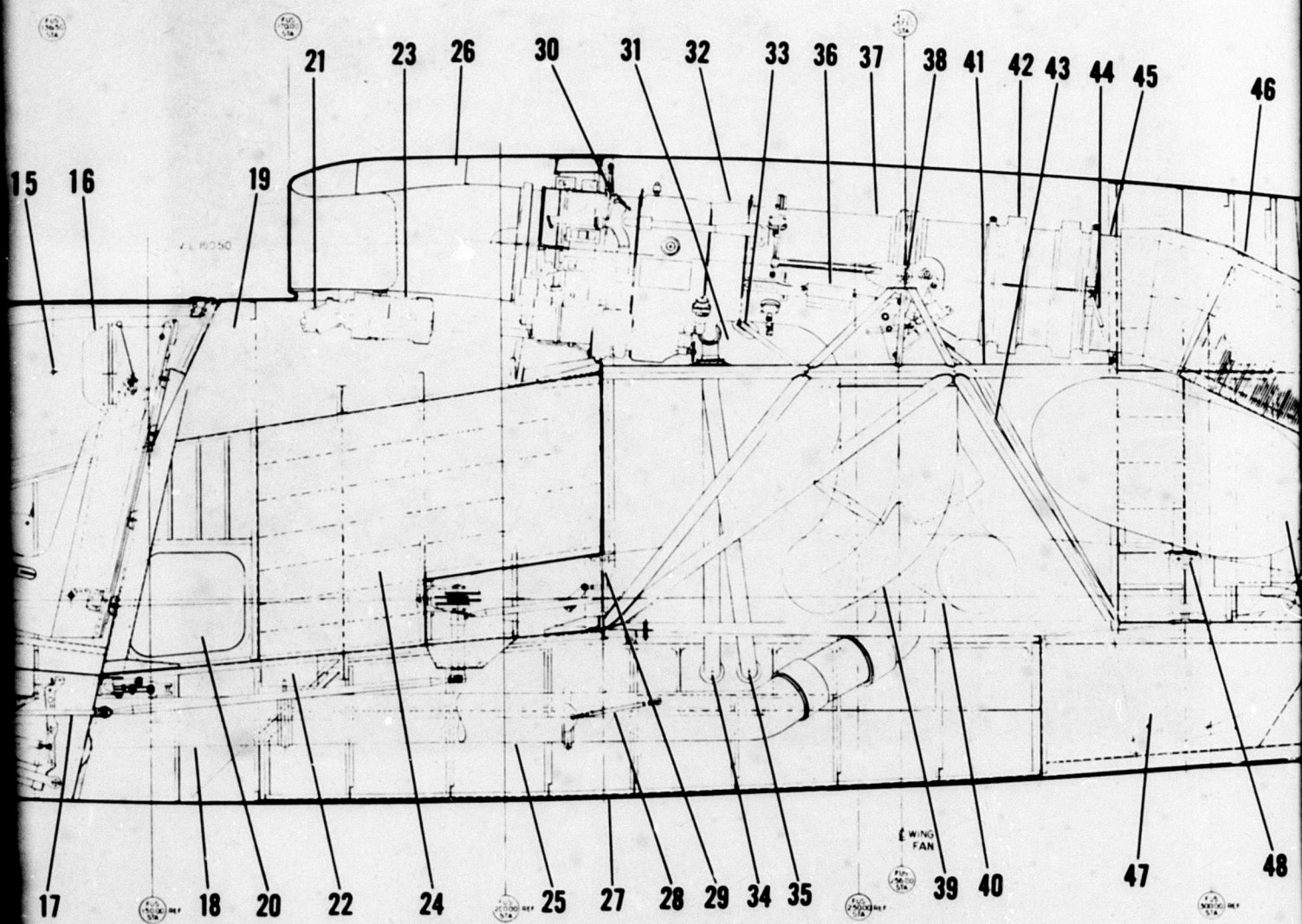
1. FLOW DIRECTION INDICATOR AND PITOT STATIC TUBE
2. PITOT MAST
3. FIBERGLAS NOSE CONE
4. PITCH CONTROL FAN INLET BELLMOUTH
5. PITCH CONTROL FAN BELLMOUTH GUIDE VANE
6. GENERAL ELECTRIC X376 PITCH CONTROL FAN
7. PITCH CONTROL FAN SIDE MOUNT
8. PITCH CONTROL DOOR
9. PITCH CONTROL FAN SCROLL
10. PITCH CONTROL FAN AFT SUPPORT TRUSS
11. RUDDER PEDAL
12. THROTTLE CONTROL QUADRANT
13. PILOT'S CONTROL STICK
14. NOSE LANDING GEAR
15. PILOT'S EYE POSITION
16. PILOT'S EJECTION SEAT
17. AILERON CONTROL SYSTEM
18. PITCH CONTROL FAN DUCT, R. H.
19. HYDRAULIC EQUIPMENT BAY
20. ELECTRICAL EQUIPMENT BAY ACCESS DOOR
21. HYDRAULIC PUMP
22. FORWARD FUEL TANK SUMP
23. GENERATOR
24. FORWARD FUEL TANK
25. PITCH CONTROL FAN DUCT, L. H.
26. FIBERGLAS NACELLE AND INLET ASSEMBLY (REMOVABLE)
27. REMOVABLE CANOE
28. PITCH CONTROL FAN DUCT HANGER
29. WING ATTACH FITTING, FORWARD
30. FRONT ENGINE MOUNT
31. FIREWALL, ENGINE DIVIDER
32. GENERAL ELECTRIC J-85-5 E
33. LATERAL ENGINE MOUNT
34. ENGINE STARTING DUCT, R. H.
35. ENGINE STARTING DUCT, L. H.
36. DIVERTER VALVE ACTUATOR
37. DIVERTER VALVE, L. H.
38. MAIN ENGINE MOUNT
39. DIVIDER DUCT, L. H. ENGINE
40. DIVIDER DUCT, R. H. ENGINE
41. FIREWALL, UPPER
42. FLEXIBLE SECTION, L. H.
43. FIREWALL, AFT
44. TAILPIPE SUPPORT LINK, FOI
45. TAILPIPE, L. H.
46. TAILPIPE SHROUD ASSEMBLY,
47. MAIN LANDING GEAR BAY
48. WING ATTACH FITTING, AFT
49. INTERMEDIATE FUEL TANK
50. AFT FUEL TANK
51. TAILPIPE SUPPORT LINK, AFT
52. THRUST ATTENUATOR DOOR
53. EXIT FAIRING
54. HORIZONTAL STABILIZER ACT
55. HORIZONTAL STABILIZER PIVC
56. HORIZONTAL STABILIZER
57. SPACE PROVISION FOR ANTI-S.
58. RUDDER TRIM TAB
59. RUDDER



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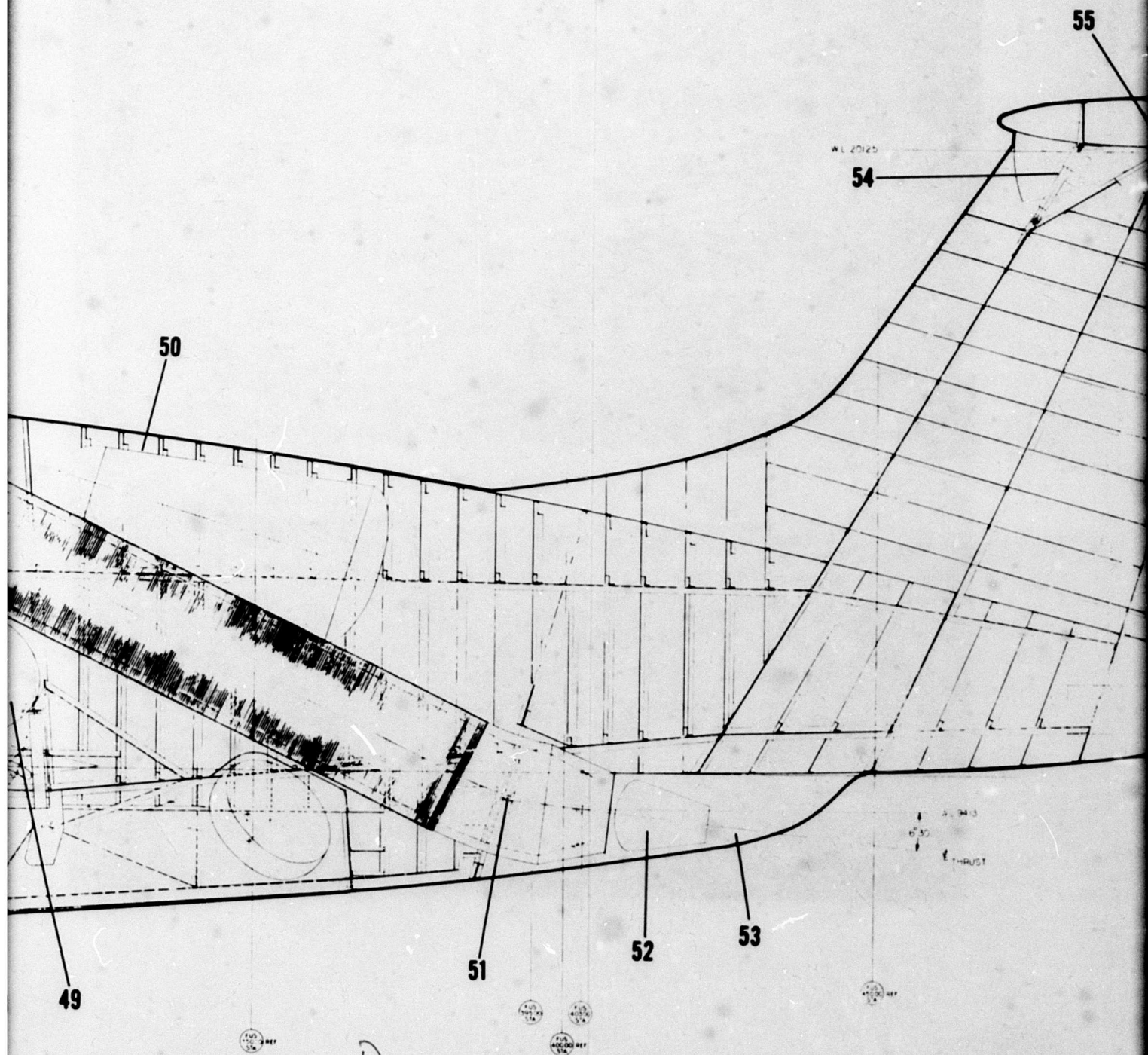


Figure 12 Inboard Profile

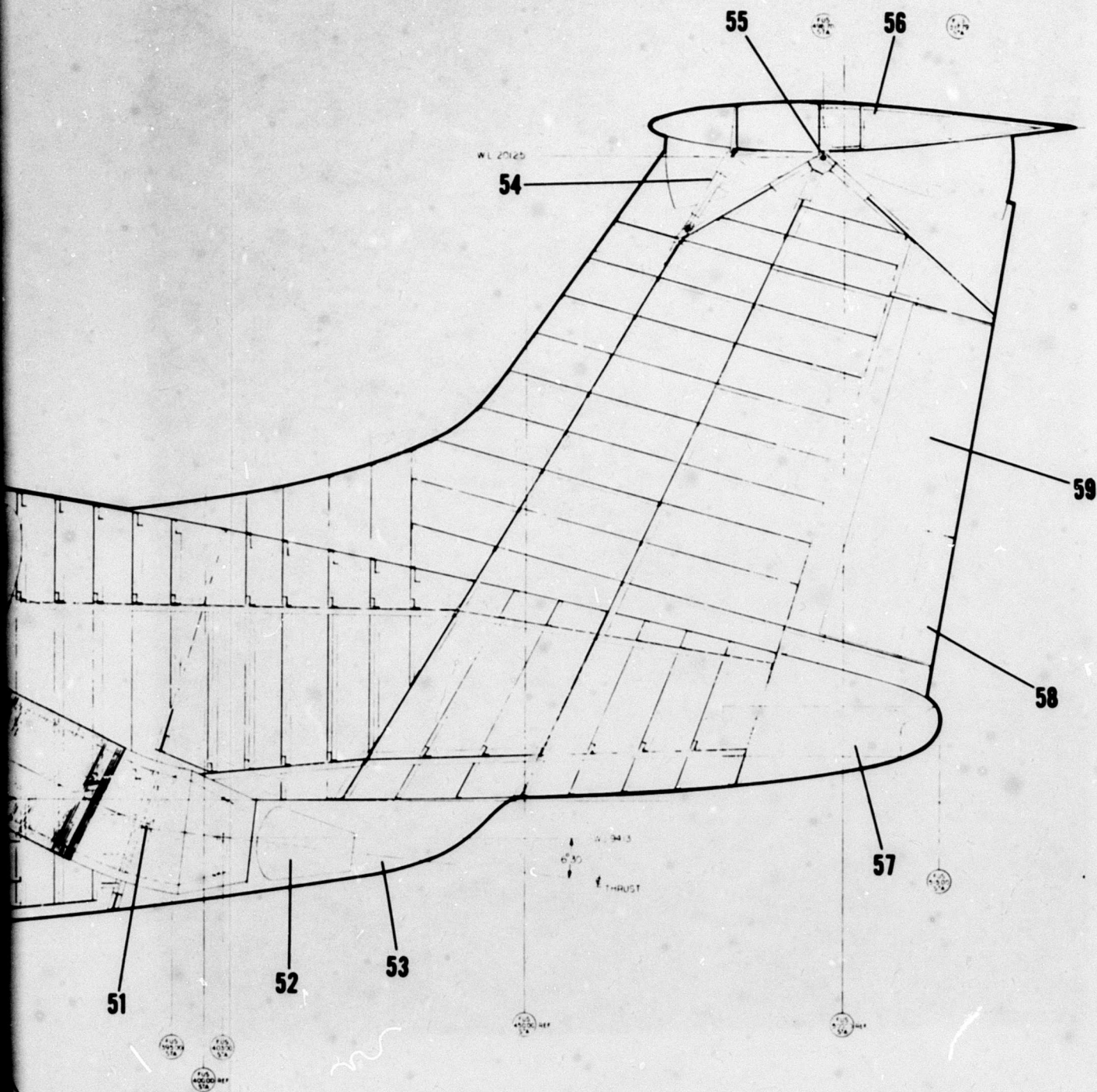


Figure 12 Inboard Profile